

[*SGML Version - See Change Record*]  
TECHNICAL MANUAL  
**DISHWASHING MACHINE**

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**01 MAY 95**



## RECORD OF CHANGES

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### NOTE

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## TABLE OF CONTENTS

Chapter/Paragraph	Page
<b>SECTION 1.0 GENERAL INFORMATION</b> . . . . .	1-1
1.1 INTRODUCTION . . . . .	1-1
1.2 SCOPE OF THE MANUAL . . . . .	1-1
1.3 EQUIPMENT DESCRIPTION . . . . .	1-1
1.4 EQUIPMENT SUPPLIED . . . . .	1-1
<b>SECTION 2.0 OPERATION</b> . . . . .	2-1
2.1 INTRODUCTION . . . . .	2-1
2.2 CONTROLS AND INDICATORS . . . . .	2-1
2.3 START-UP PROCEDURE . . . . .	2-2
2.4 SHUT-DOWN PROCEDURE . . . . .	2-3
<b>SECTION 3.0 FUNCTIONAL DESCRIPTION</b> . . . . .	3-1
<b>SECTION 4.0 SCHEDULED MAINTENANCE</b> . . . . .	4-1
4.1 INTRODUCTION . . . . .	4-1
4.2 WEEKLY REQUIREMENTS FOR INSPECTION AND MAINTENANCE . . . . .	4-1
4.2.3 De-liming. . . . .	4-1
4.3 QUARTERLY REQUIREMENTS FOR INSPECTION AND MAINTENANCE . . . . .	4-1
<b>SECTION 5.0 TROUBLESHOOTING</b> . . . . .	5-1
<b>SECTION 6.0 CORRECTIVE MAINTENANCE</b> . . . . .	6-1
6.1 INTRODUCTION . . . . .	6-1
6.2 MAINTENANCE AND REPAIR PROCEDURES . . . . .	6-1
6.2.1 Clean fresh hot rinse strainer. . . . .	6-1
6.2.2 Removal and replacement of electric tank heater. . . . .	6-2
6.2.3 Removal and replacement of thermometers. . . . .	6-2
6.2.4 Overload relay settings and functions. See . . . . .	6-2
6.2.4.1 Overload current setting. . . . .	6-2
6.2.4.2 Auto reset selection. . . . .	6-2
6.2.4.3 Reset test. . . . .	6-3
6.2.4.4 Stop function. . . . .	6-3
6.2.5 Adjust wash tank temperature. . . . .	6-3

**TABLE OF CONTENTS - Continued**

Chapter/Paragraph	Page
6.2.5.2 Steam heated tank. . . . .	6-3
6.2.6 Adjust rinse booster temperature. . . . .	6-3
6.2.6.2 Steam heated booster. . . . .	6-3
6.2.6.3 Electrically heated booster. . . . .	6-3
6.2.7 Inspection and repair of solenoid actuated valves. . . . .	6-4
6.2.7.2 Preliminary electrical check. . . . .	6-4
6.2.7.3 Inspection and repair of final rinse solenoid valve. . . . .	6-4
6.2.8 Removal and replacement of recirculating pump. . . . .	6-5
<b>SECTION 7.0 PARTS LIST . . . . .</b>	<b>7-1</b>
7.1 INTRODUCTION . . . . .	7-1
7.2 PARTS PROCUREMENT . . . . .	7-1
7.3 STANDARD REPAIR PARTS . . . . .	7-1
<b>SECTION 8.0 INSTALLATION . . . . .</b>	<b>8-1</b>
8.1 UNPACKING . . . . .	8-1
8.2 INSTALLATION . . . . .	8-1
8.2.1 Mechanical and Piping. . . . .	8-1
8.2.2 Electrical. . . . .	8-2
8.2.3 Check-Out of the Installation. . . . .	8-3

**LIST OF TABLES**

Table	Title	Page
1-1	DATA CHARACTERISTICS . . . . .	1-2
2-1	CONTROLS AND INDICATORS (machines manufactured after SN 938043) . . . .	2-1
2-2	CONTROLS AND INDICATORS (machines manufactured prior to SN 938043) . .	2-1
5-1	OPERATOR'S TROUBLESHOOTING GUIDE . . . . .	5-1
5-2	MAINTENANCE TROUBLESHOOTING GUIDE . . . . .	5-2

**LIST OF ILLUSTRATIONS**

Figure	Title	Page
6-1	OVERLOAD RELAY SETTINGS . . . . .	6-6
7-1	Parts List Drawing - Sht 1 of 2 SN 938043 and higher . . . . .	7-3
7-2	Parts List Drawing - Sht 2 of 2 SN 938043 and higher . . . . .	7-5
7-3	Parts List Drawing Prior to SN 938043 . . . . .	7-7
7-4	Float Switch Assembly Prior to SN 938043 . . . . .	7-9
7-5	Parts List Drawing - 1/2 HP. Pump . . . . .	7-11
7-6	Float and Probe Devices . . . . .	7-13
7-7	Piping Assembly - Steam Booster . . . . .	7-15
7-8	Steam Booster Assembly . . . . .	7-17
7-9	Hatco 9 & 18 KW Electric Booster . . . . .	7-19
7-10	Hatco 11.4 KW Booster . . . . .	7-21
7-11	Control Panel Layout - Sht 1 of 2 SN 938043 and higher . . . . .	7-23
7-12	Control Panel Layout - Sht 2 of 2 SN 938043 and higher . . . . .	7-25
7-13	Control Panel Layout - Sht 1 of 2 Prior to SN 938043 . . . . .	7-27
7-14	Control Panel Layout - Sht 2 of 2 Prior to SN 938043 . . . . .	7-29
8-1	Installation - Right Side Booster . . . . .	8-5
8-2	Installation - Left Side Booster . . . . .	8-7
8-3	Electrical Wiring Schematic Steam Heated Machine SN 938043 and higher . . . . .	8-9
8-4	Electrical Wiring Schematic Electrically Heated Machine SN 938043 and higher . . . . .	8-10
8-5	Electrical Wiring Schematic Steam and Electric Heat Prior to SN 938043 . . . . .	8-11



## SAFETY SUMMARY

The following general safety notices supplement the specific warnings and cautions appearing in this manual:

All service except for routine shut-down procedures and operator's troubleshooting procedures must be performed by qualified maintenance personnel.

Prior to any work on the Model 45SA5 dishwasher involving service of electrical, steam, or water systems, the dishwasher and booster heater must be de-energized by turning the electrical supply power "Off" and closing appropriate steam and water valves.

The following is a summary of the warnings and cautions appearing in the text of this manual to alert personnel to potentially hazardous situations:

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### WARNING

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**Do not open the door during the wash or rinse cycle because hot water is being sprayed. An interlock is provided to stop the cycle if the door is opened, but some hot water may escape. (Page 2-3)**

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### WARNING

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**Hot water and surface temperatures exist in the machine. Allow the machine to cool to 110° F before proceeding. Wear rubber gloves.**

**Remove the lower wash manifold.**

**Rotate the lower rinse manifold to the vertical position.**

**Remove the scrap trays.**

**Remove the drain overflow tube. (Page 2-4)**

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### WARNING

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**Electric float switches, probes and heating elements must be cleaned daily. Accumulations of grease, minerals or debris will cause faulty operation of tank fill and heating systems. Use Scotch-Brite or equivalent cleaning pads on heavy dirt. (Page 2-4)**

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**WARNING**

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**Inside of the machine is hot. Allow the machine to cool to 110°F. before proceeding. Wear rubber gloves. (Page 4-1)**

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**WARNING**

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**Turn off power supply to the control enclosure. This inspection should only be done by a qualified electrician. (Page 4-2)**

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**WARNING**

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**Prior to any work on the Model 45SA5 dishwasher involving service of electrical, steam, or water systems, the dishwasher and booster must be de-energized by turning the electrical supply power "Off" and closing appropriate valves.**

**Wear rubber gloves while performing the following steps. Do not drink, eat or smoke.**

**Troubleshooting of certain electrical functions require access to live electrical circuits inside the electrical control enclosure. Troubleshooting or repair of the electrical equipment should only be done by a qualified electrician. (Page 5-1)**

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**WARNING**

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**Prior to any work on the Model 45SA5 dishwasher involving service of electrical, steam, or water systems, the dishwasher and booster must be de-energized by turning the electrical supply power "Off" and closing appropriate valves.**

**Wear rubber gloves while performing the following steps. Do not drink, eat or smoke.**

**Troubleshooting of certain electrical functions require access to live electrical circuits inside the electrical control enclosure. Troubleshooting or repair of the electrical equipment should only be attempted by a qualified electrician. (Page 6-1)**

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**WARNING**

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The following steps require testing with machine power on. These tests should only be made by a qualified electrician. (Page 6-4)

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**WARNING**

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Both the dishwasher and the booster heater must be securely bolted to deck plates. (Page 8-1)

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**WARNING**

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Dangerous voltages are present on connections to the electrical control enclosure and electric booster heater. Observe normal safety precautions for high voltage electrical equipment when connecting to the local distribution system. All work should be done by a qualified electrician. (Page 8-2)

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**WARNING**

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At startup, and after any draining of the electric booster, turn off the 440 volt power to the booster during the initial wash tank fill (2.3.6). This will allow the booster reservoir to fill and trapped air to be purged without overheating of booster heating elements. (Page 8-3)

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**CAUTION**

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The operator should become thoroughly familiar with the equipment and these operating instructions prior to starting the machine. (Page 2-1)



## CHAPTER 1

### SECTION 1.0

#### GENERAL INFORMATION

#### 1.1 INTRODUCTION

This technical manual provides information for the installation, operation, inspection and maintenance of the Model 45SA5 series of dishwashers manufactured by the Insinger Machine Company, Philadelphia, PA.

#### 1.2 SCOPE OF THE MANUAL

[Chapter 1](#), [Chapter 2](#), [Chapter 3](#), and [Chapter 8](#) provide information required for startup, operation, and installation of the equipment. [Chapter 4](#), [Chapter 5](#), [Chapter 6](#) and [Chapter 7](#) provide information on maintenance operations.

#### 1.3 EQUIPMENT DESCRIPTION

The Model 45SA5 dishwasher is a single tank, front loading, undercounter dishwasher used for the washing of plates, glassware, and small utensils in 16" by 16" racks. The machine processes up to 45 racks per hour through timed wash and final hot rinse cycles.

#### 1.4 EQUIPMENT SUPPLIED

Dishwashers are supplied with wash tank and final rinse water booster heating options as follows:

Model	Wash Tank Heat	Booster Heat
45SA5-F1	Steam Coil	Steam
45SA5-F2	Electric	9 KW Electric (Hatco)
45SA5-F2C	Electric	9 KW Electric (Hubbell)
45SA5-F2D	Electric	18 KW Electric (Hatco)
45SA5-F2NM	Electric	11.4 KW Electric (Hatco)

In addition to the wash tank and booster heat options listed above, the 45SA5-F2NM minimizes the amount of magnetic material by using a bronze pump housing and impeller and a 300 series stainless steel booster water tank.

Each dishwasher is supplied with the following loose components, which are to be mounted adjacent to the machine by the installing activity:

Electrical control enclosure.

Detergent dispenser reservoir and controller.

Thermometer bracket.

(2) Plate racks.

(2) Cup, bowl and cutlery racks.

(2) Manifold cleanout brushes.

**Table 1-1 DATA CHARACTERISTICS**

Manufacturer:

Insinger Machine Company, Philadelphia, PA

Type:

Insinger Model 45SA5 with tank heat and booster options.

Characteristics:

Type: Single tank, front loading, undercounter dishwasher.

Capacity: 45 racks (16" by 16") per hour, manually loaded.

Rinse Water Requirements:

Rated flow: 4.1 gpm peak at 20 psig.

36 gal/hr average flow.

Supply temperature: 140° F. minimum.

Electrical Power Requirements:

Power supply: 440 vac, 3 phase, 60 Hz.

Operating current -	45SA5-F1:	1.4 amps (dishwasher & booster)
	45SA5-F2:	3.1 amps (dishwasher)
		9.9 amps (9 KW booster)
	45SA5-F2C:	3.1-amps (dishwasher)
		11.8 amps (9 KW booster)
	45SA5-F2D:	3.1 amps (dishwasher)
		19.8 amps (18 KW booster)
	45SA5-F2NM:	3.1 amps (dishwasher)
		12.6 amps (11.4 KW booster)

Steam Requirements (45SA5-F1 only):

Pressure (dry saturated steam):

16 psig. minimum.

50 psig. maximum.

Flow Rate (tank heat plus booster):

19 lb/hr average.

94 lb/hr peak.

Weight:

Shipping: 381 lbs.

Operating: Dishwasher - 180 lbs.

Electrical Control Panel - 30 lbs.

Volume:

Crated: 59" lg. x 40" w. x 76" h.

## CHAPTER 2

### SECTION 2.0 OPERATION

#### 2.1 INTRODUCTION

The Model 45SA5 dishwasher is a heavy duty machine designed for daily use in a naval shipboard environment.

#### **CAUTION**

**The operator should become thoroughly familiar with the equipment and these operating instructions prior to starting the machine.**

#### 2.2 CONTROLS AND INDICATORS

**Table 2-1** CONTROLS AND INDICATORS (machines manufactured after SN 938043)

ITEM #	CONTROL	TYPE	FUNCTION
1	Power Switch	Toggle switch on control panel	Controls power on & off.
2	Power On	Red pilot light on control panel	Signals control power on & off.
3	Wash Cycle Switch	Toggle switch on control panel	Manual - will remain in continuous wash cycle for extended wash or de-liming procedure. Auto - normal operation for timed wash and rinse cycles.
4	Wash Indicator	White pilot light on control panel.	Signals wash cycle operation.
5	Rinse Indicator	Amber pilot light on control panel.	Signals rinse cycle operation.
6	5-Amp, Circuit Breaker	Circuit breaker located on control panel.	Over-current protection for control circuit.
7	Temperature gauges - wash & rinse	Gauges located on remote bracket.	Indicate water temperature of wash tank and rinse water.
8	Ball valves - steam & water	Valve located on respective piping string.	Steam ball valve used to open or close incoming steam line. Water ball valve used to open or close incoming water line.

**Table 2-2** CONTROLS AND INDICATORS (machines manufactured prior to SN 938043)

ITEM #	CONTROL	TYPE	FUNCTION
1	Wash Indicator	White pilot light on control panel.	Signals wash cycle operation.
2	Rinse Indicator	Amber pilot light on control panel.	Signals rinse cycle operation.

**Table 2-2** CONTROLS AND INDICATORS (machines manufactured prior to  
SN 938043) - Continued

ITEM #	CONTROL	TYPE	FUNCTION
3	5-Amp Circuit Breaker	Circuit breaker located on control panel.	Over-current protection for control circuit.
4	Temperature gauges - wash & rinse	Gauges located on remote bracket.	Indicate water temperature of wash tank and rinse water.
5	Ball valves - steam & water	Valve located on respective piping string.	Steam ball valve used to open or close incoming steam line. Water ball valve used to open or close incoming water line.
6	Tank Heat Switch.	Toggle switch on control panel	Controls tank heat on & off
7	Tank Fill Switch	Toggle switch on control panel.	Controls tank fill on & off.
8	Cycle Switch	Switch located on control panel.	Controls the wash and rinse cycles.

## 2.3 START-UP PROCEDURE

2.3.1 Before starting the machine, inspect the inside and make sure that:

1. The drain overflow tube is in place.
2. The suction strainer is in place over the pump intake.
3. The scrap screens are clean and in place.
4. The upper and lower wash manifolds are securely installed.
5. The plastic caps at the ends of all manifolds are installed and hand tight.

2.3.2 Check that the hot water supply valve is open and electric power services are on. On steam heated machines, check that the wash tank and booster steam supply valves are open.

2.3.3 Fill the detergent dispenser reservoir in accordance with the detergent supplier's recommendations. Only flake, beaded, or pelletized detergents should be used.

On the back of the detergent dispenser controller, turn the toggle switch to the "On" position..

2.3.4 Connect the rinse injector supply line to a source of rinse water conditioner.

On the back of the rinse injector, turn the toggle switch to the "On" position.

### NOTE

The toggle switches on the detergent dispenser and rinse injector may be permanently left in the "On" position unless service is required on the devices.



2.3.5 On the electrical control enclosure, move the Wash Cycle Switch to the "Auto" position (machines manufactured after SN 938043). Move the Power Switch to the "On" position. The red "Power On" light will illuminate.

2.3.6 Close the machine door. Machine will automatically fill. (Machines manufactured prior to SN 938043 do not have the automatic fill feature. The tank is filled by moving the Tank Fill selector switch to the "On" position). When the operating level is reached, the machine will automatically cycle through a timed wash and rinse sequence then stop.

#### NOTE

The wash pump will not start if the water in the rinse booster is below 180° F.  
Allow time for the water to reach this temperature.

During the wash cycle, the white "Wash" light will come on. During the rinse cycle, the amber "Rinse" light will come on.

2.3.7 When the wash tank reaches operating level, the thermostatically controlled tank heat will be activated. Allow the tank temperature to reach 156° F. before washing.

#### WARNING

**Do not open the door during the wash or rinse cycle because hot water is being sprayed. An interlock is provided to stop the cycle if the door is opened, but some hot water may escape.**

2.3.8 Open the door, insert a rack of soiled dishware, and close the door. The machine will automatically cycle through timed wash and rinse sequence and then stop. (Machines manufactured prior to SN 938043 do not have this auto-cycle feature. Press the Cycle switch to begin washing and rinsing). At this time, the amber "Rinse" light will go off. Open the door, unload the rack of clean dishware, and repeat the cycle.

#### NOTE

Overloading racks will impede the proper cleaning of dishware.

## 2.4 SHUT-DOWN PROCEDURE

2.4.1 The machine should be cleaned at the end of each meal service.

2.4.2 Turn the Power Switch to the "Off" position. On steam heated machines, also close the manual steam valve on the wash tank steam supply.

2.4.3 Drain the wash tank:

---

**WARNING**

---

**Hot water and surface temperatures exist in the machine. Allow the machine to cool to 110° F before proceeding. Wear rubber gloves.**

**Remove the lower wash manifold.**

**Rotate the lower rinse manifold to the vertical position.**

**Remove the scrap trays.**

**Remove the drain overflow tube.**

2.4.4 After draining, remove the upper wash manifold, the pump suction strainer, and the scrap tray spacers.

2.4.5. Remove the end caps from the wash manifolds and clean with the provided brush. Flush after cleaning and replace caps.

2.4.6 Clean and flush the scrap trays and tray spacers, the pump suction strainer, and the drain overflow tube.

2.4.7 Clean and flush the entire inside of the wash tank, wash and rinse chamber, and door. Wipe the inside of the drain overflow tube fitting. Pay special attention to moving float mechanisms, electric conductivity probes, electric heater elements, and steam coils.

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**WARNING**

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**Electric float switches, probes and heating elements must be cleaned daily. Accumulations of grease, minerals or debris will cause faulty operation of tank fill and heating systems. Use Scotch-Brite or equivalent cleaning pads on heavy dirt.**

2.4.8 Use a small wire or pin to clean the rinse nozzles of mineral accumulations.

2.4.9 Replace all removed parts in reverse order.

2.4.10 Door should remain open to allow interior surfaces to dry.

## CHAPTER 3

### SECTION 3.0

#### FUNCTIONAL DESCRIPTION

The 45SA5 dishwasher consists of a wash tank and integral wash and rinse chamber with a front access door. A detergent solution in the wash tank is heated to a nominal 156° F. operating temperature by either a submerged steam coil (45SA5-F1 series) or an electric immersion heater (45SAS-F2 series).

During the wash cycle, a centrifugal pump draws the hot detergent solution through a suction strainer and then forces the solution under pressure to the upper and lower wash manifolds, where the solution exits through slots and impacts against the dishware in the rack. The spent wash solution returns to the wash tank through the scrap trays, where debris from the dishware is captured for later disposal.

The detergent strength is maintained by a concentration sensing controller and detergent supply reservoir.

A hot fresh final rinse cycle follows the wash cycle. The incoming fresh water supply is first reduced to 20 psig. by a pressure regulating valve and then heated to 180° F. (minimum) by either a steam powered heat exchanger (45SA5-F1 series) or an electrically powered booster heater (45SA5-F2 series), located adjacent to the dishwasher. The hot rinse water enters the wash and rinse chamber through upper and lower rinse manifolds, and exits through rinse nozzles and impacts against the dishware in the rack. The spent rinse water returns to the wash tank through the scrap screens.

Both the steam and electric powered boosters have a low water temperature interlock that prevents or interrupts washing when the water in the booster is below 180°F.

The residual heat in the rinse water helps to maintain wash tank temperature. The additional volume of rinse water, when added to the wash tank, increases the solution level and then overflows into the drain, carrying away any floating grease and debris.

A feed pump injects a conditioner into the hot rinse water during the rinse cycle. This conditioner improves the rinsing and drying of the dishware by promoting a "sheeting" action of the rinse water.

A remote electrical control enclosure contains a magnetic contactor, overload protection for the drive motor, control relays, wash and rinse cycle timers, selector switches, and pilot lights.



## CHAPTER 4

### SECTION 4.0

#### SCHEDULED MAINTENANCE

##### 4.1 INTRODUCTION

The 45SA5 dishwasher is a rugged and simple machine. The scheduled maintenance described in this chapter is mostly a periodic set of inspections and cleaning.

##### 4.2 WEEKLY REQUIREMENTS FOR INSPECTION AND MAINTENANCE

###### 4.2.1 Inspect for external leakage.

Inspect the outside of the machine, including all piping, piping components, and rinse water boosters, for leakage. Tighten or repair as necessary.

###### 4.2.2 Inspection of probes and moving floats.

Turn the Power Switch to the "Off" position. On steam heated machines, also close the manual steam valve on the wash tank steam supply. Drain the wash tank.

---

#### **WARNING**

---

**Inside of the machine is hot. Allow the machine to cool to 110°F. before proceeding. Wear rubber gloves.**

After draining, manually move each float to verify that there is no binding or sticking. Check all electrical probes for dirt and mineral accumulation. Clean as required.

4.2.3 De-liming. Accumulated mineral deposits must be removed from the inside surfaces of the machine on a periodic basis. The frequency of de-liming depends on the hardness of the water, the type and concentration of detergents used, and the amount of washing time. Until the proper frequency can be determined, de-lime on a weekly schedule.

Follow the instructions supplied with the de-liming chemicals. To provide the continuous wash cycle required for de-liming, turn the Wash Cycle toggle switch on the control enclosure to the "Manual" position. This setting bypasses the wash cycle timer and rinse cycle.

##### 4.3 QUARTERLY REQUIREMENTS FOR INSPECTION AND MAINTENANCE

###### 4.3.1 Check and adjust final rinse pressure.

4.3.1.1 The final hot rinse pressure must be 20 psig, while the rinse water is flowing. Adjust the pressure reducing valve during a rinse cycle (CW to increase, CCW to decrease pressure).

4.3.1.2 If the supply pressure to the booster is 20 psig. or greater, and the rinse pressure is below 20 psig and can not be increased, the strainer in the pressure regulating valve may be clogged. Clean the strainer per [6.2.1](#).

4.3.2 Clean steam strainers (45SA5-F1 only).

4.3.2.1 Close the manual valves on the wash tank heat and booster steam supplies.

4.3.2.2 Remove the plug and strainer basket from each "Y" type steam strainer and flush clean.

4.3.2.3 Replace strainer and plug.

4.3.2.4 Open steam supply valves.

4.3.3 Inspect condensate traps (45SA5-F1 only).

4.3.3.1 Condensate traps are located below the steam booster and below the wash tank.

4.3.3.2 Check to see that each trap is operating correctly, allowing condensate to flow when the supply valve is open. A condensate trap that is stuck shut, possibly due to corrosion, will not allow the condensate to flow, and no heat will be released within the booster or tank. A trap that is stuck open will not allow the heated unit to reach full operating temperature. A faulty trap should be replaced.

4.3.4 Inspect inside of control enclosure.

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**WARNING**

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**Turn off power supply to the control enclosure. This inspection should only be done by a qualified electrician.**

4.3.4.1 Open the cover of the control enclosure.

4.3.4.2 Inspect electrical and mechanical fasteners and tighten loose connections.

4.3.4.3 Inspect overload assembly for proper setting.

4.3.4.4 Inspect indicating lights; replace any cracked lenses or burned out bulbs.

4.3.4.5 Close and secure control enclosure cover.

## CHAPTER 5

### SECTION 5.0

#### TROUBLESHOOTING

This chapter contains information to assist the operator and/or maintenance personnel in troubleshooting abnormal operation. Personnel involved must be familiar with the description of the equipment and the functioning of all components, as described in [Chapter 3](#).

The following tables list the more common symptoms which may be experienced, their causes, and the recommended corrective action. The tables are separated into operator and maintenance actions.

#### **WARNING**

**Prior to any work on the Model 45SA5 dishwasher involving service of electrical, steam, or water systems, the dishwasher and booster must be de-energized by turning the electrical supply power "Off" and closing appropriate valves.**

**Wear rubber gloves while performing the following steps. Do not drink, eat or smoke.**

**Troubleshooting of certain electrical functions require access to live electrical circuits inside the electrical control enclosure. Troubleshooting or repair of the electrical equipment should only be done by a qualified electrician.**

#### **NOTE**

This section covers actions that can be performed by the operator, without the use of tools.

**Table 5-1 OPERATOR'S TROUBLESHOOTING GUIDE**

SYMPTOM OF TROUBLE	POSSIBLE CAUSE	SOLUTION
1. Machine will not operate.	a. No power.	a. Move POWER switch to ON.
2. Tank will not hold water.	a. Drain standpipe not installed. b. Pump petcock opened.	a. Install drain standpipe. b. Close pump petcock.
3. Tank fills beyond overflow level.	a. Obstruction in drain standpipe. b. Clogged drain line.	a. Remove obstruction. b. Remove drain standpipe (water is HOT!), if water does not drain, maintenance must "snake" drain line.
4. Water leaks from around door.	a. Door is not seated. b. Clogged spray pipes.	a. Check for proper seating. b. Clean with brush provided.
5. Weak or ineffective wash spray.	a. Clogged spray pipes. b. Manifolds not installed properly. c. Suction strainer clogged.	a. Clean with brush provided. b. Ensure proper placement of upper and lower manifolds. c. Clean suction strainer.

**Table 5-1 OPERATOR'S TROUBLESHOOTING GUIDE - Continued**

SYMPTOM OF TROUBLE	POSSIBLE CAUSE	SOLUTION
6. Weak or ineffective final rinse spray.	a. Lime deposit on spray nozzles. b. Low water pressure. c. Closed supply valve.	a. Clean nozzles. b. Should be 20 PSI flowing. c. Open valve.

**NOTE**

This section covers actions that should be performed by qualified maintenance personnel.

**Table 5-2 MAINTENANCE TROUBLESHOOTING GUIDE**

SYMPTOM OF TROUBLE	POSSIBLE CAUSE	SOLUTION
1. Machine will not operate.	a. No power. b. Blown fuse/ breaker.  c. Power shut off at disconnect switch. d. Motor overload protection tripped.	a. Check power supply. b. Replace fuse; reset breaker and troubleshoot source of problem. c. Move disconnect switch to ON.  d. Press reset button; if motor overload trips repeatedly, refer to overload problems in troubleshooting section.
2. Tank will not hold water.	a. Drain standpipe not installed. b. Pump petcock open.	a. Install drain standpipe. b. Close pump petcock.
3. Tank fills beyond overflow level.	a. Obstruction in drain standpipe. b. Clogged drain line.	a. Remove obstruction. b. Remove overflow tube (water is HOT!), if water does not drain, clean the drain line with a "snake".
4. Water leaks from around door.	a. Door is not seated. b. Clogged spray pipes.	a. Check for proper seating and repair as necessary. b. Clean with brush provided.
5. Weak or ineffective wash spray.	a. Clogged spray pipes. b. Manifolds not installed properly. c. Suction strainer clogged. d. Pump motor running in the wrong direction. e. Pump impeller worn.	a. Clean with brush provided. b. Ensure proper placement of upper and lower spray pipes. c. Clean suction strainer. d. Correct electrically, proper pump direction indicated by arrow on pump housing. e. Replace pump impeller.
6. Weak or ineffective final rinse spray.	a. Lime deposit on spray nozzles. b. Closed supply valve. c. Low water pressure. d. Final rinse nozzles worn.	a. Clean nozzles. b. Open valve. c. Adjust to 20 PSI flowing. d. Replace final rinse nozzles.
7. Final rinse spray will not turn off.	a. Clogged final rinse solenoid valve. b. Worn disc and seat in final rinse solenoid valve.	a. Turn off water supply, disassemble valve & clean internal parts of lime & scale. b. Turn off water supply, disassemble valve and replace with repair kit.
8. Water hammer.	a. Excessive line pressure.	a. Install shock arresters.



**Table 5-2** MAINTENANCE TROUBLESHOOTING GUIDE - Continued

<b>SYMPTOM OF TROUBLE</b>	<b>POSSIBLE CAUSE</b>	<b>SOLUTION</b>
9. Machine vibrates (See also Water hammer, #8).	a. Worn motor bearing. b. Reversed pump rotation.	a. Replace motor. b. Correct electrically, proper pump direction indicated by arrow on pump housing.
10. Tank and/or booster will not hold specified temperature.	a. No power. b. Thermostat not adjusted or defective. c. Heat circuitry not working. d. Temperature gauge inaccurate/ defective. For Electric Heat: e. Power turned off. f. Immersion heaters limed or defective. For Steam Heat g. Steam turned off. h. Not enough steam. i. Steam solenoid clogged. j. Worn solenoid piston and seat. k. Steam condensate trap clogged. l. Clogged line strainer.	a. Check power supply b. Adjust or replace thermostat. c. Troubleshoot heat circuitry using wiring diagram provided in this manual. d. Replace temperature gauge. e. Turn power on. f. De-lime or replace immersion heater. g. Turn steam supply on. h. Adjust steam pressure per machine specs. i. Turn off steam supply, disassemble valve and clean internal parts. j. Turn off steam supply. Replace valve. k. Turn off steam supply: disassemble steam trap and clean, repair or replace. l. Turn off steam supply and clean strainer.
11. Tank not filling/tank heat coming on with no water in tank.	a. Level float dirty or defective. b. Level control system not working.	a. Clean or replace level float. b. Troubleshoot level control circuitry using wiring diagram provided in this manual.



## CHAPTER 6

### SECTION 6.0

#### CORRECTIVE MAINTENANCE

##### 6.1 INTRODUCTION

This chapter contains instructions for maintenance and replacement of components that can be damaged or fail in normal operation.

##### 6.2 MAINTENANCE AND REPAIR PROCEDURES

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#### WARNING

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**Prior to any work on the Model 45SA5 dishwasher involving service of electrical, steam, or water systems, the dishwasher and booster must be de-energized by turning the electrical supply power "Off" and closing appropriate valves.**

**Wear rubber gloves while performing the following steps. Do not drink, eat or smoke.**

**Troubleshooting of certain electrical functions require access to live electrical circuits inside the electrical control enclosure. Troubleshooting or repair of the electrical equipment should only be attempted by a qualified electrician.**

6.2.1 Clean fresh hot rinse strainer.

6.2.1.1 Close the rinse water shut-off valve.

6.2.1.2 The strainer is located within the pressure reducing valve. Back off the pressure adjusting screw. Loosen the bell housing, remove spring, disk, and friction washer. Remove bolt, pressure plate, and diaphragm. Remove cartridge assembly.

6.2.1.3 Remove the strainer screen and flush with water or blast of compressed air.

6.2.1.4 Replace strainer screen and parts in reverse order.

6.2.1.5 Open the rinse water shut-off valve.

6.2.1.6 Operate the machine through a cycle. During the rinse phase, adjust the rinse water pressure to 20 psig.

## 6.2.2 Removal and replacement of electric tank heater.

6.2.2.1 Turn off dishwasher power at the main disconnect switch.

6.2.2.2 Drain the wash tank per 2.4.3.

6.2.2.3 Remove the external heater cover and disconnect the three power wires - Disconnect the electrical conduit.

6.2.2.4 On the inside of the wash tank, loosen and remove the large nut from the heater body and withdraw the heater from the tank.

6.2.2.5 Install a new heater in the tank hole. Use plumber's putty between the heater body and the outside of the tank. Install and tighten the large nut from the inside of the tank.

6.2.2.6 Reconnect the power wires and conduit and replace the heater cover.

## 6.2.3 Removal and replacement of thermometers.

6.2.3.1 If a thermometer is suspected of being defective, first check the unit against a reference thermometer and compare readings. Tolerance is plus or minus 2°F.

6.2.3.2 To remove the wash thermometer, first turn the Power Switch on the electrical control enclosure to the "Off" position. Drain the wash tank per 2.4.3. Tank does not need to be drained to replace the rinse thermometer.

1. At the back of the dishwasher, loosen the split hex nut that holds the capillary bulb in the rinse line fitting on the wash tank wall. Withdraw the bulb.
2. Remove the thermometer mounting bracket and remove the outer hex nut from the stem of the thermometer. Withdraw the capillary and bulb through the hole in the bracket.
3. Install a new thermometer in the bracket. Pass the capillary and bulb through the hole in the bracket, and install and tighten the hex nut on the stem of the thermometer. Replace the thermometer bracket.
4. Clean the inside of the bulb fitting on the back of the dishwasher. Install the bulb and tighten the split hex nut.

6.2.4. Overload relay settings and functions. See [Figure 6-1](#).

6.2.4.1 Overload current setting. Lift the clear plastic cover. With a small screwdriver, align the overload setting dial value (for the motor nameplate full load current for 440 volts) with the set point. The nominal full load current for 440 volt operation of a typical 1/2 hp. motor is 1.2 amps.

6.2.4.2 Auto reset selection. The overload relay is factory installed in the auto reset configuration. Always use this configuration. If the manual reset function has been selected (which may be the case with a replacement part), the reset selector will extend beyond the plastic cover and the pointer will align with the "M". To change, lift the clear plastic cover, push the reset selector in and turn clockwise until the square pointer aligns with the "A".

6.2.4.3 Reset test. Lift the clear plastic cover. Use a small screwdriver to press the recessed test button. With auto reset selected, the overload trip indicator will change to yellow and both auxiliary contacts (NO and NC) will change state as long as the test button is pressed in.

6.2.4.4 Stop function. Press the red stop button to operate the NC auxiliary contact. This contact (OL Reset) is wired in series with the motor contactor (M1) and, when opened, will stop the pump motor.

## 6.2.5 Adjust wash tank temperature.

6.2.5.1 The wash tank temperature should be 156° to 160° F.

6.2.5.2 Steam heated tank. Tank temperature is sensed by a capillary bulb and controlled by a mechanically operated thermostatic valve on the steam inlet line. A scale, numbered from 1 to 10, is on the side of this valve. Higher scale settings correspond to higher operating temperatures. To adjust this valve, place the 1/4" diameter rod (chained to the valve body) in one of the adjustment holes on the valve stem collar. Turn the collar in 1/4 scale divisions (CCW to increase, CW to decrease the setting and temperature) and allow tank temperature to stabilize between adjustments.

To replace this valve, first close the manual tank steam valve. Remove the capillary and bulb by loosening the compression coupling. Then loosen and remove the valve unions. Reverse order to install a new valve.

6.2.5.3 Electrically heated tank. Tank temperature is sensed by a thermistor on the tank wall and regulated by a temperature control board in the electrical control enclosure. Locate the round slotted adjustment disk on the temperature control board. Rotate in small increments (CW to increase, CCW to decrease temperature) and allow tank temperature to stabilize between adjustments.

To replace the electric tank heat temperature control board or thermistor, disconnect and tag all wires, and then remove the board or thermistor. Note connection points for red and black thermistor wires.

To replaced a mechanical thermostat, disconnect and tag all wires, remove the mounting screws, and then withdraw the capillary tube from the tank.

## 6.2.6 Adjust rinse booster temperature.

6.2.6.1 The booster water outlet-temperature should be 190° to 195°F.

6.2.6.2 Steam heated booster. The temperature controller is on the front of the booster. Unscrew the round cover. The water outlet temperature control switch is on the left, marked "Temp Set 190°F." Use a hex key to rotate the pointer and change the setting. Higher scale settings correspond to higher outlet temperatures. While the rinse is operating, turn the pointer in 1/2 scale increments and observe the rinse temperature over several rinse cycles.

The switch on the right is the low water temperature interlock switch, factory set at 180°F.

To remove this thermostat, disconnect and tag all wires. Remove the electrical conduit from the thermostat housing. Unscrew the entire thermostat assembly from the pipe tee on the booster.

## 6.2.6.3 Electrically heated booster.

1. Hatco 9 and 18 KW models: The thermostat is located inside the lower front of the booster. Remove the access plate marked "Remove for access to thermostats and high limit switch". Rotate the slotted screw in small increments (CW to increase, CCW to decrease temperature) and allow tank temperature to stabilize between adjustments. Note that 1/6 turn is approximately 12°F. Observe the rinse temperature over several rinse cycles.
2. Hatco 11.4 KW models: The thermostat is located inside the booster. The adjustment screw is on the lower left front of the booster, and is accessible without removing the main cover. Rotate the slotted screw in small increments (CW to increase, CCW to decrease temperature) and allow tank temperature to stabilize between adjustments. Note that 1/6 turn is approximately 12°F. Observe the rinse temperature over several rinse cycles.
3. Hubbell 9 KW models: The thermostat is located inside the booster. Remove the main cover plate. The thermostat is on the center left of the booster. Rotate the slotted screw in the center of the marked dial on the thermostat cover in small increments (CW to increase, CCW to decrease temperature) and allow tank temperature to stabilize between adjustments. Observe the rinse temperature over several rinse cycles.

#### 6.2.7 Inspection and repair of solenoid actuated valves.

6.2.7.1 Solenoid valves are used on the machine for controlling steam to the booster heater (steam heated machines) and the flow of final hot rinse water. If the valve in question will not close, or will not open, inspect the valve.

#### 6.2.7.2 Preliminary electrical check.

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### **WARNING**

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**The following steps require testing with machine power on. These tests should only be made by a qualified electrician.**

1. A solenoid valve is opened by a mechanical plunger which is lifted when voltage is applied to the valve coil. Make sure there is voltage to the coil. If the solenoid valve will not open and there is no voltage at the coil, the problem is somewhere in the solenoid control circuit (thermostat, wires, or ON/OFF switch).
2. If the valve will not open and there is correct voltage to the coil, disconnect all power to machine and remove the coil. Visually check for signs of heat discoloration or carbon deposit due to a short circuit in the coil. Check the coil winding with a meter for electrical continuity. No continuity means an open coil and it must be replaced.

#### 6.2.7.3 Inspection and repair of final rinse solenoid valve.

1. Disconnect electrical power supply to machine. Shut off steam or water supply to the valve.
2. Remove cap on top of the coil housing and remove housing and coil.
3. Unscrew 4 hex head bolts and lift out bonnet from valve body. Note positioning of spring and pilot plunger.
4. Remove main piston.
5. Inspect the rubber diaphragm for wear, deterioration, or holes. Inspect all parts for dirt, wear, lime build-up or physical damage. Clean or replace as required.

A repair kit (D2643) is available to rebuild this valve. If the seat or the bottom half of the valve is worn or badly corroded, the entire valve must be replaced.

6. Reverse procedure to re-assemble valve.

**NOTE**

A repair kit for the steam solenoid valve is NOT available. The entire valve must be replaced.

6.2.8 Removal and replacement of recirculating pump.

6.2.8.1 Before disassembling a pump, drain the tank and remove the suction strainer (inside tank). Inspect the pump inlet for foreign objects.

6.2.8.2 Working parts of pump can be serviced by removing the pump motor and impeller adapter (held on by four (4) 3/8" dia. hex head screws) from the pump body.

**NOTE**

It is not necessary to remove pump body from the machine.

6.2.8.3. Repair or replace pump motor or impeller as required.

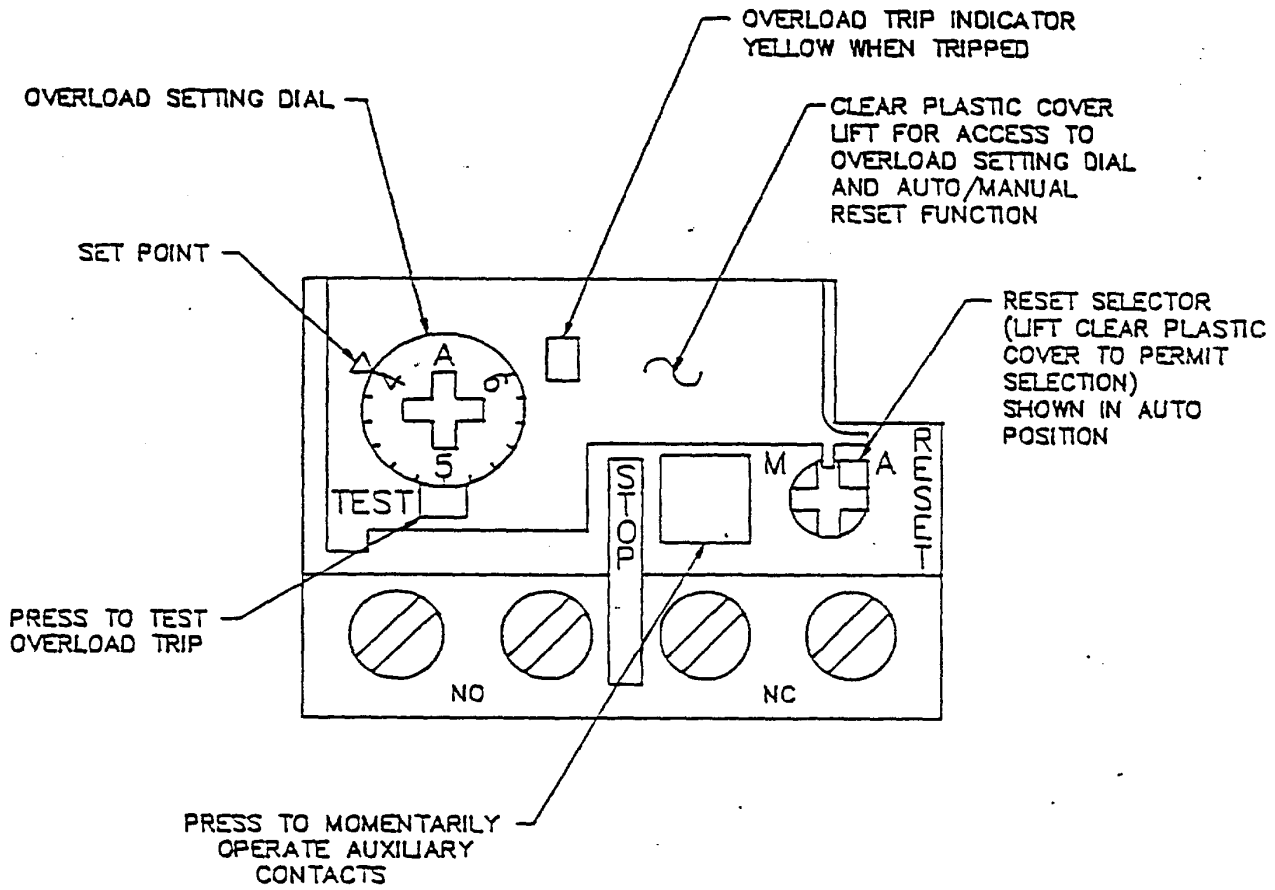


FIGURE 6-1  
OVERLOAD RELAY SETTINGS

Figure 6-1 OVERLOAD RELAY SETTINGS



## CHAPTER 7

### SECTION 7.0

#### PARTS LIST

#### 7.1 INTRODUCTION

This chapter lists replaceable parts, referenced to part breakdown drawings.

No listing has been provided for parts of permanently assembled items, or for those items which are not suited to field replacement.

#### 7.2 PARTS PROCUREMENT

All parts are available from the Insinger Machine Company, Philadelphia, Pennsylvania 19135.

#### 7.3 STANDARD REPAIR PARTS

**Table 7-1** STANDARD REPAIR PARTS

ITEM	QTY	DESCRIPTION	INSINGER P/N	MFR	MFR P/N
1	1	Temperature gauge	D2390	Weiss Instrument	02019 Spec. 914-25 PX3
2	1	Door handle	D2099	Kurz-Kasch	C-11181
3	1	Pump seal	D2-534	Scot Pumps	101.000.110
4	1	Solenoid valve, 3/4", steam	D2490-R3	Asco	8220G2324/60
5	1	Solenoid valve, 3/4", water	D2597	Parker Hannifin	12F22C2V48AA FGC01
6	1	Contacto	DE1-66	Square D	8502PE5.00
7	2	Timer, wash & rinse	DE7-27	NCC	ZIT-00060067
8	1	Relay	DE2-38	IDEC	RY25-U
9	1	Relay base	DE2-37	IDEC	SY25-05
10	1	Booster heater, electric, 9KW	DE14C9E3A <sup>2</sup>	Hatco	C-9
11	1	Booster heater, electric, 9KW	--- <sup>3</sup>	Hubbell	17740
12	1	Booster heater, electric, 18KW	DE14C18E3A <sup>4</sup>	Hatco	C-18
13	1	Booster heater, electric, 11.4KW	DE14C12E3A <sup>5</sup>	Hatco	C-12
14	1	Immersion heater	DE13-SB73 <sup>6</sup>	Chromalox	156-500592025

<sup>2</sup>Used on model 45SA5-F2

<sup>3</sup>Used on model 45SA5-F2C

<sup>4</sup>Used on model 45SA5-F2D

<sup>5</sup>Used on model 45SA5-F2NM

<sup>6</sup>Used on models 45SA5-F2, 45SA5-F2C, 45SA5-F2D, 45SA5-F2NM

**7.3 STANDARD REPAIR PARTS (machines manufactured prior to SN 938043)****Table 7-2** STANDARD REPAIR PARTS (machines manufactured prior to SN 938043)

ITEM	QTY	DESCRIPTION	INSINGER P/N	MFR	MFR P/N
1	1	Temperature gauge	D2390	Weiss Instruments	02019 Spec. 914-25 PX3
2	1	Door handle	D2099	Kurz-Kasch	C-11181
3	1	Pump seal	D2-534	Scot Pumps	101.000.110
4	1	Solenoid valve, 3/4", steam	D2490 <sup>1</sup>	Parker-Hannifin	12FS3C2348AC FGC05
5	1	Solenoid valve, 3/4", water	D2597	Parker-Hannifin	12F22C2148AA FGC05
6	1	Contactor	DE1-12	Furnas	41NB30AF
7	1	Timer, wash	DE7-5	SSAC	TS1423
8	1	Timer, rinse	DE7-6	SSAC	TS2423
9	1	Relay	DE2-6	P&B	KUP11A15115V
10	1	Relay base	DE2-7	P&B	27E121
11	1	Booster heater, electric, 9KW	DE14C9E3A <sup>2</sup>	Hatco	C-9
12	1	Booster heater, electric, 9KW	--- <sup>3</sup>	Hubbell	17740
13	1	Booster heater, electric, 18KW	DE14C18E3A <sup>4</sup>	Hatco	C-18
14	1	Booster heater, electric, 11.4KW	DE14C12E3A <sup>5</sup>	Hatco	C-12
15	1	Immersion heater	DE13-SB73 <sup>6</sup>	Chromalox	156-500592025

<sup>1</sup>Used on model 45SA5-F1<sup>2</sup>Used on model 45SA5-F2<sup>3</sup>Used on model 45SA5-F2C<sup>4</sup>Used on model 45SA5-F2D<sup>5</sup>Used on model 45SA5-F2NM<sup>6</sup>Used on models 45SA5-F2, 45SA5-F2C, 45SA5-F2D, 45SA5-F2NM

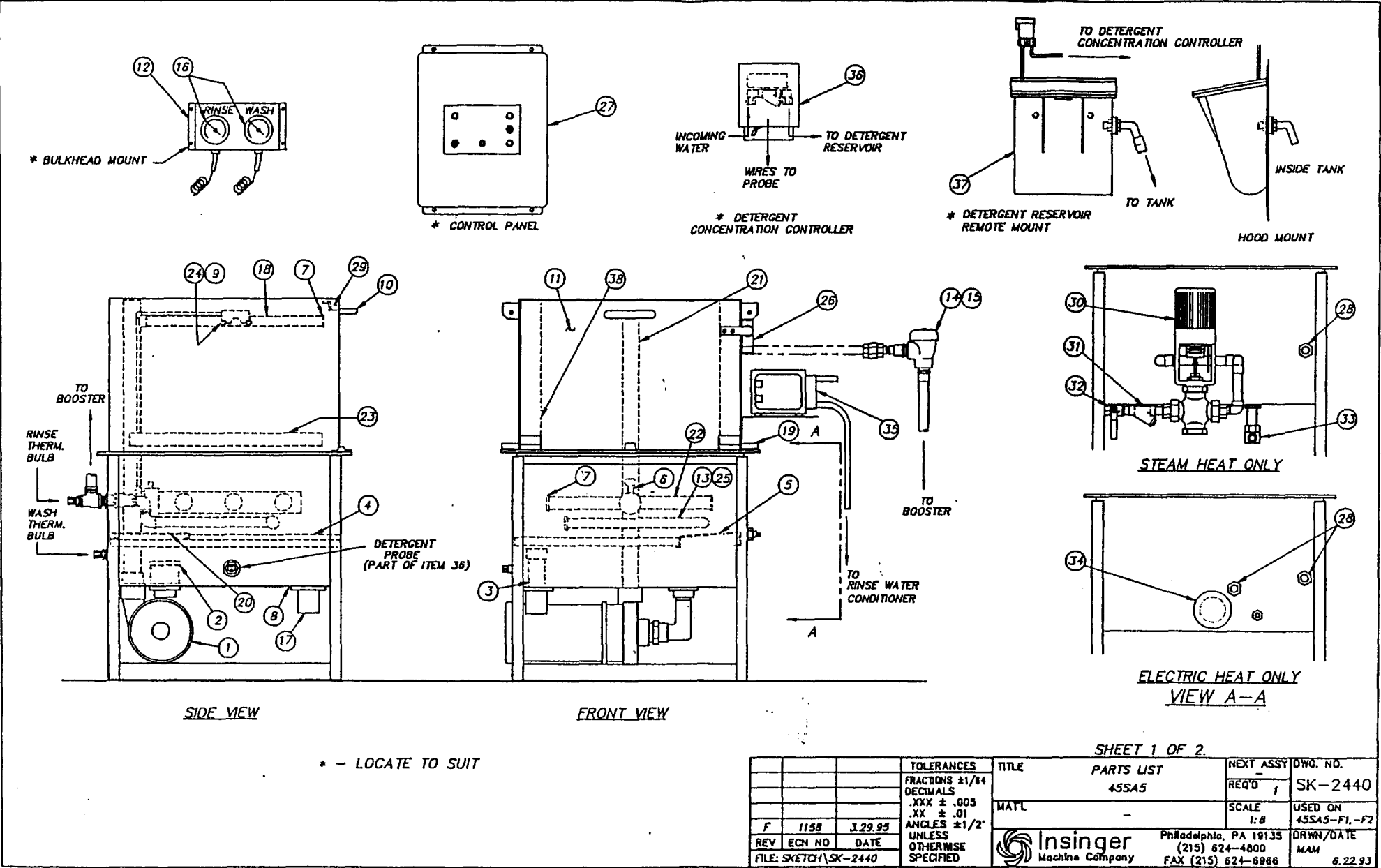


Fig. 7-1

Figure 7-1 Parts List Drawing - Sht 1 of 2 SN 938043 and higher



ITEM	PART NO.	DESCRIPTION	QTY.
30	D2267A	TEMPERATURE REGULATOR 3/4 IPS	1
31	D248JA	"Y" STRAINER 1/2 IPS	1
32	D2339	BALL VALVE 1/2 IPS	1
33	D2102	STEAM TRAP 3/8 IPS	1
34	DE13-SB-73	TANK HEATER 1.5 KW	1
35	D2470-46	RINSE INJECTOR BETA R-2122	1
36	C-1000	DETERGENT CONCENTRATION CONTROLLER	1
37	DR-100	DETERGENT RESERVOIR	1
38	967-85	BAFFLE	2

ITEM	PART NO.	DESCRIPTION	QTY.
1	DE11-BJ	PUMP & MOTOR ASSY.	1
2	D2-541	SUCTION STRAINER ASSY.	1
3	963-25	OVERFLOW SKIMMER PIPE	1
4	967-71	SCRAP SCREEN	2
5	967-74	SCRAP SCREEN SPACER - SIDE	1
6	D91	THUMB SCREW	1
7	D2-554-J	PIPE PLUG	7
8	D514	GASKET	1
9	D2769	NOZZLE, UPPER RINSE	4
10	D2099	DOOR HANDLE	1
11	J43-30	DOOR ASSY.	1
12	963-47	THERMOMETER GUARD	1
13	D641	SPRAY COIL ASSY.	1
14	D2243	VACUUM BREAKER	1
15	D2244	VACUUM BREAKER REPAIR KIT	1
16	D2390	THERMOMETER	2
17	967-82	DRAIN FLANGE	1
18	199-42	SPRAY PIPE - UPPER	1
19	259-12	HINGE	2
20	963-44	SCRAP SCREEN SPACER - REAR	1
21	963-8A	DISCHARGE TUBE ASSY.	1
22	963-12A	MANIFOLD ASSY.	1
23	967-7	TRACK	1
24	D2079	SPRAY BODY - UPPER	1
25	D2770	NOZZLE, LOWER RINSE	6
26	967-77	MICROSWITCH ASSY.	1
27	SK-3574	ELECT. CONTROL PANEL (SEE PARTS LIST)	1
28	1089-189	LIQUID LEVEL FLOAT SWITCH	1(5), 2(E)
29	967-40	DOOR LATCH ASSEMBLY	1

Fig. 7-2

*SHEET 2 OF 2.*

- - STEAM HEAT ONLY
- - ELECTRIC HEAT ONLY

			TOLERANCES	TITLE	PARTS LIST	NEXT ASSY	DWG. NO.
			FRACTIONS ±1/64		-	REQD	SK-2440
			DECIMALS		45SA5	1	
			.XXX ± .005	MATL	-	SCALE	USED ON
			.XX ± .01			FULL	45SA5-FI,-FZ
F	1158	I 29.95	ANGLES ±1/2°				DRWN/DATe
			UNLESS OTHERWISE SPECIFIED	Insingher Machine Company	Philadelphia, PA 19135 (215) 624-4800 FAX (215) 624-6985	MAN	6.22.93
REV	ECN NO	DATE					
FILE: SKETCH/SK-2440							

Figure 7-2 Parts List Drawing - Sht 2 of 2 SN 938043 and higher



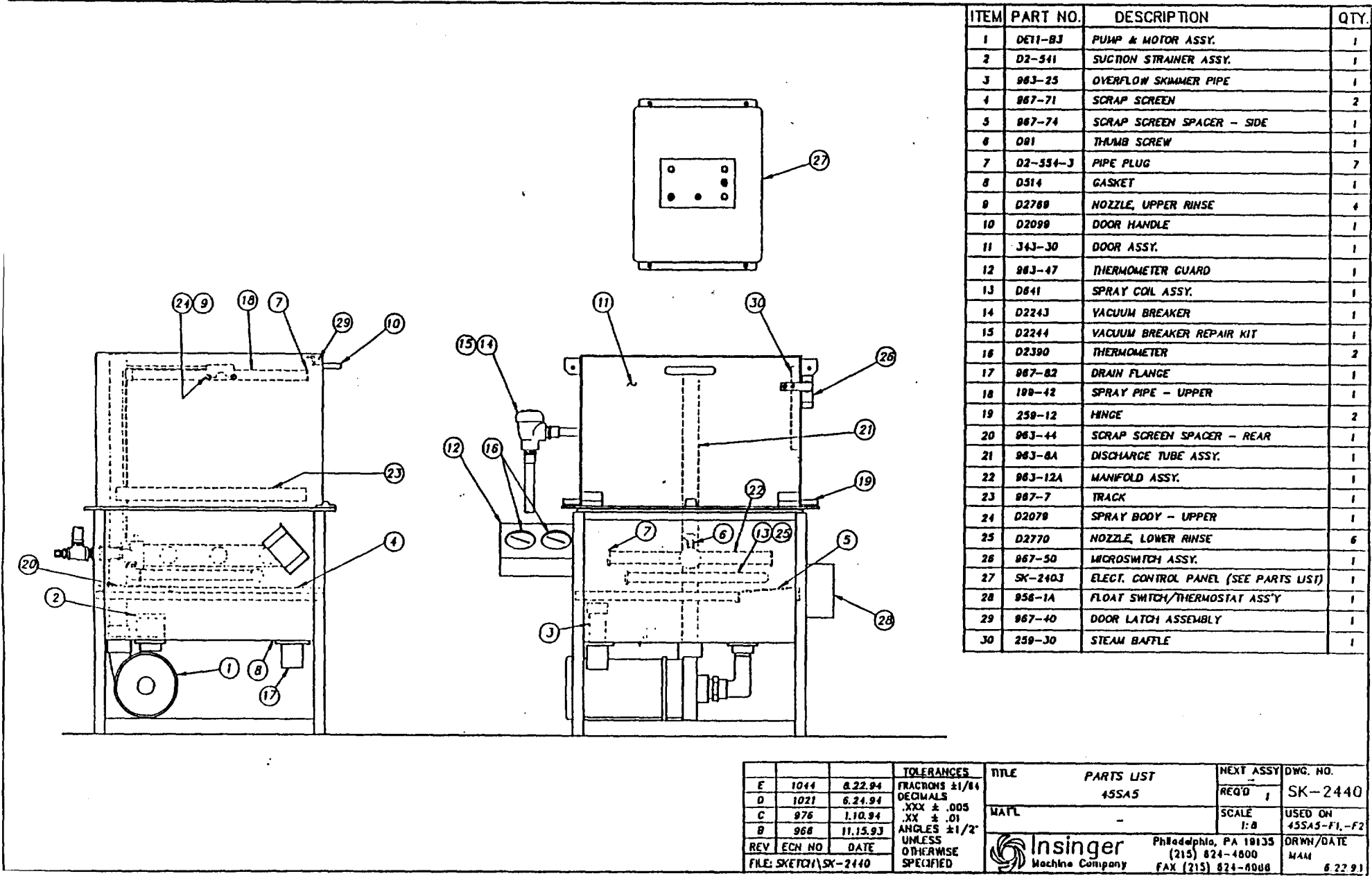


Fig. 7-3

Figure 7-3 Parts List Drawing Prior to SN 938043





Δ (2) D326E-C WAS (1) D326A-C AND  
(1) D-334 (ITEM 17 & 18), AND ADDED  
PACKING MAT'L. NOTE. 5-20-86  
Δ ECN #316 (9-6-89)

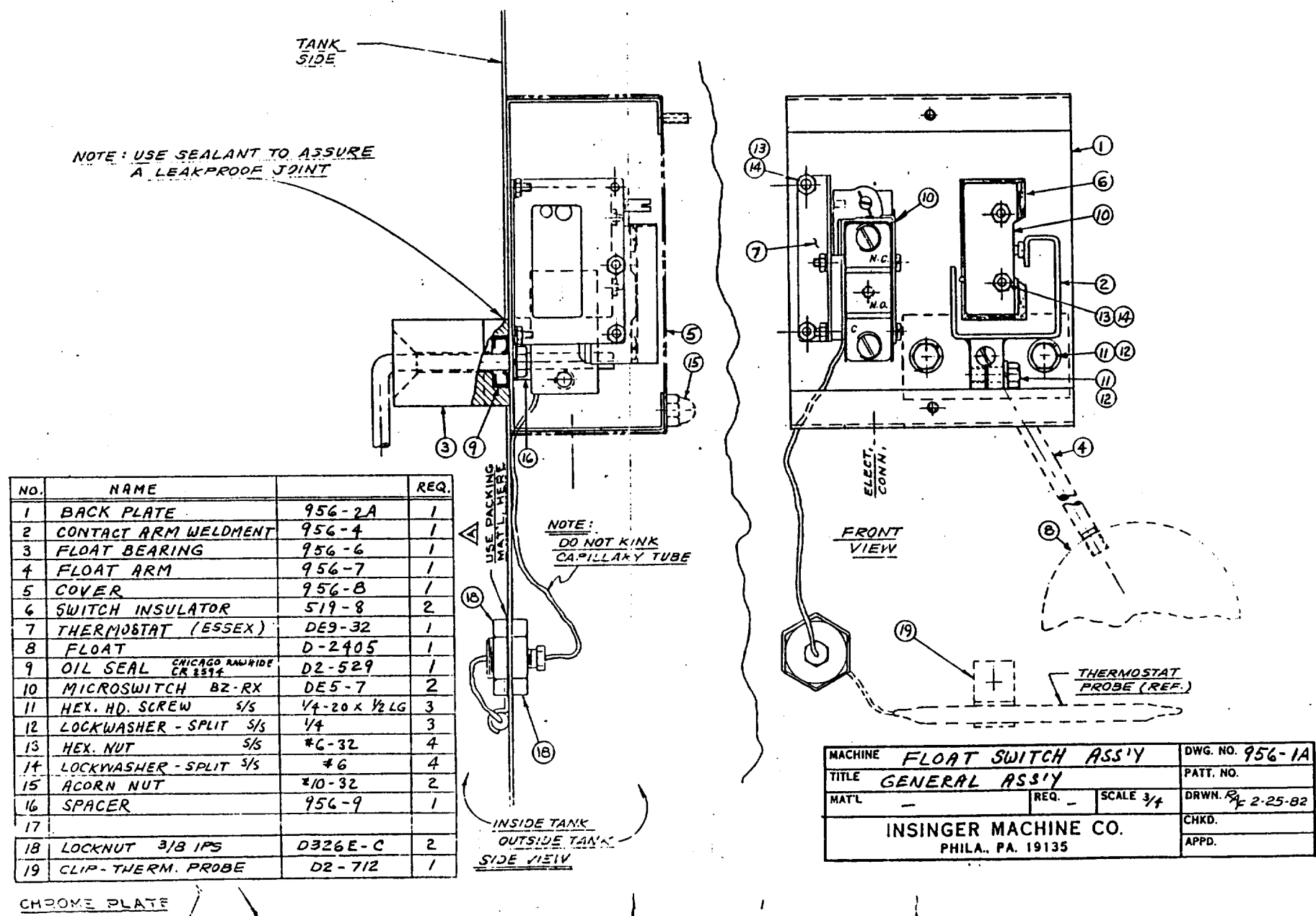


Fig. 7-4

Figure 7-4 Float Switch Assembly Prior to SN 938043



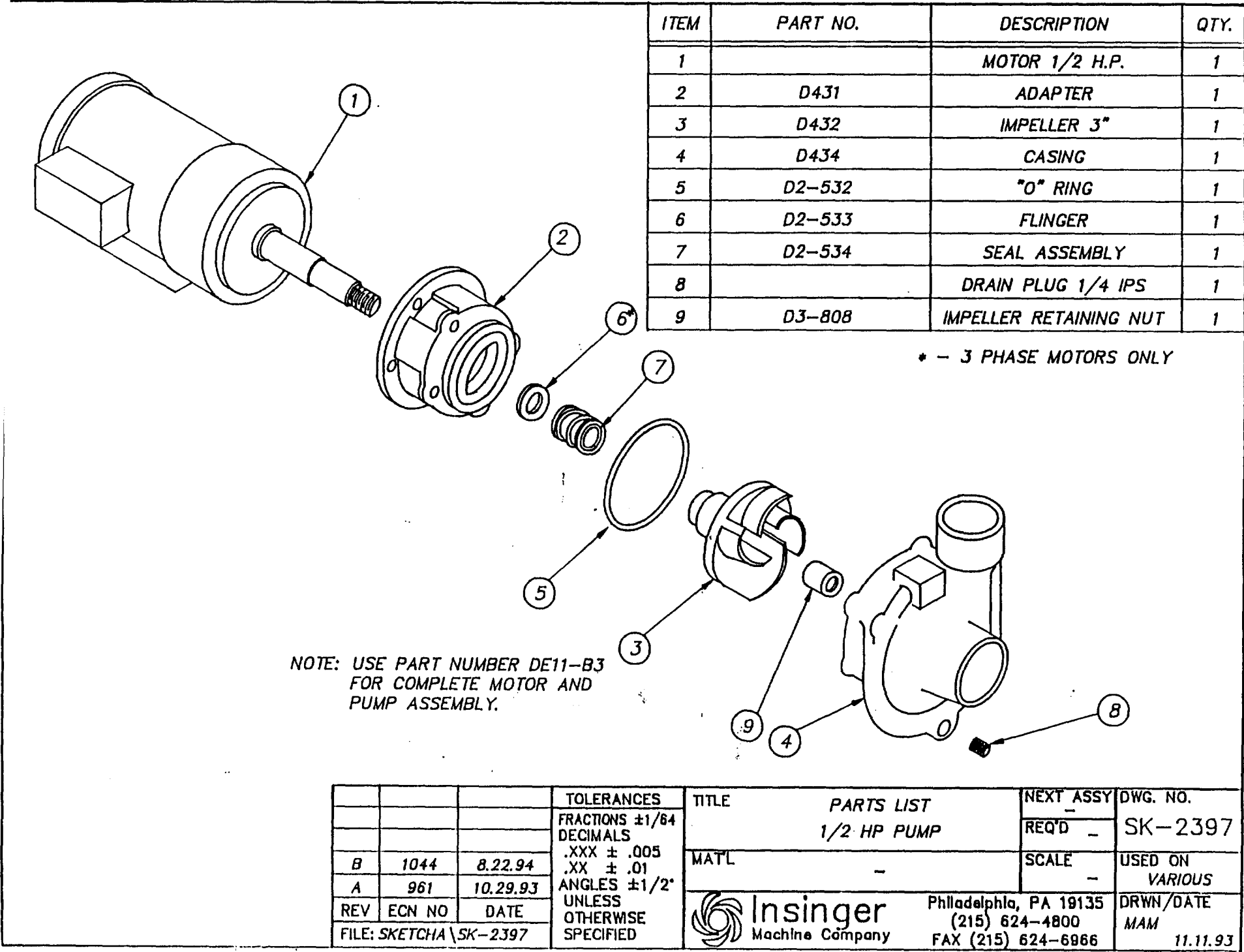


Fig. 7-5

Figure 7-5 Parts List Drawing - 1/2 HP. Pump



Fig. 7-6

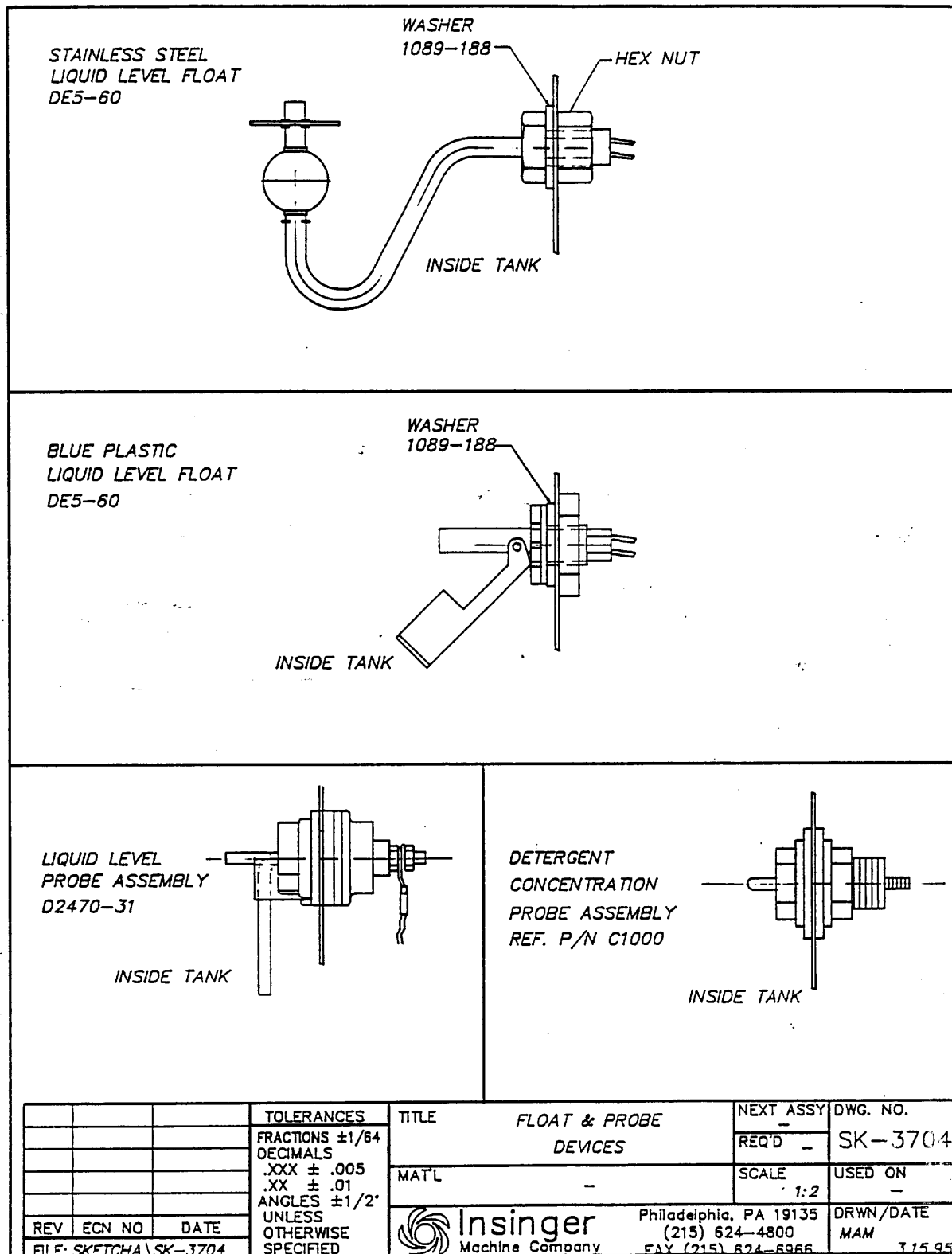


Figure 7-6 Float and Probe Devices



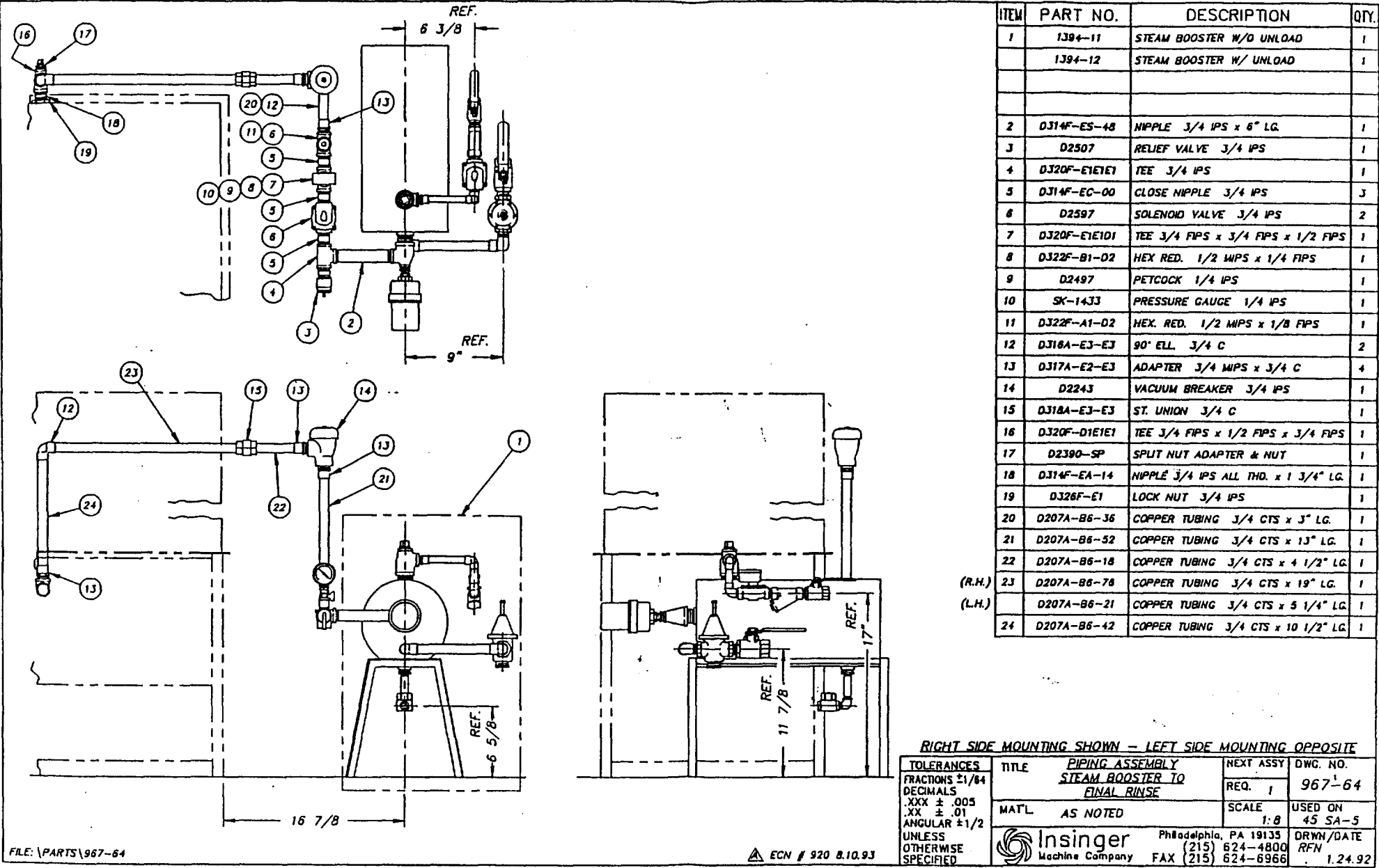


Figure 7-7 Piping Assembly - Steam Booster





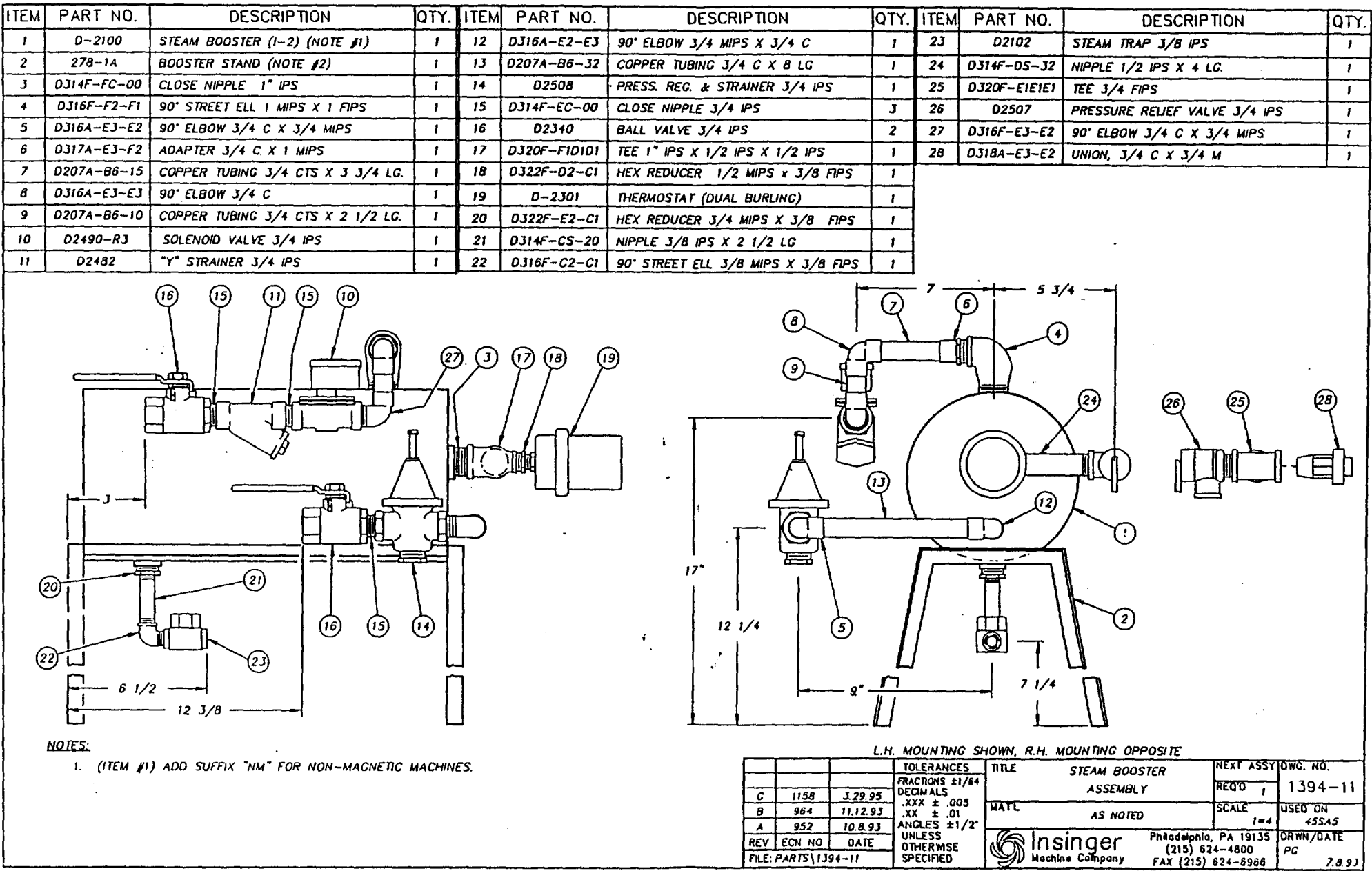


Figure 7-8 Steam Booster Assembly



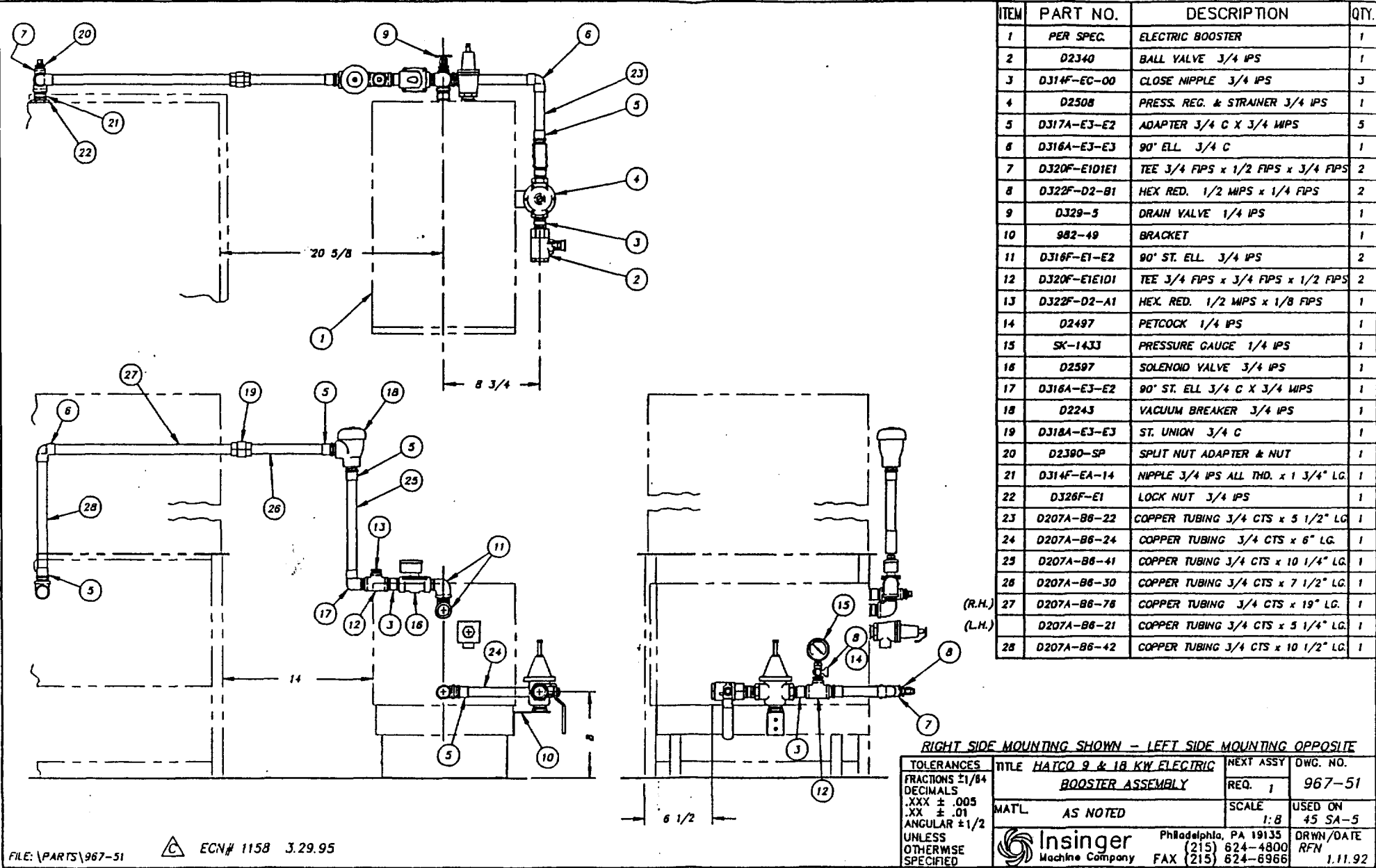


Fig. 7-9

Figure 7-9 Hatco 9 & 18 KW Electric Booster



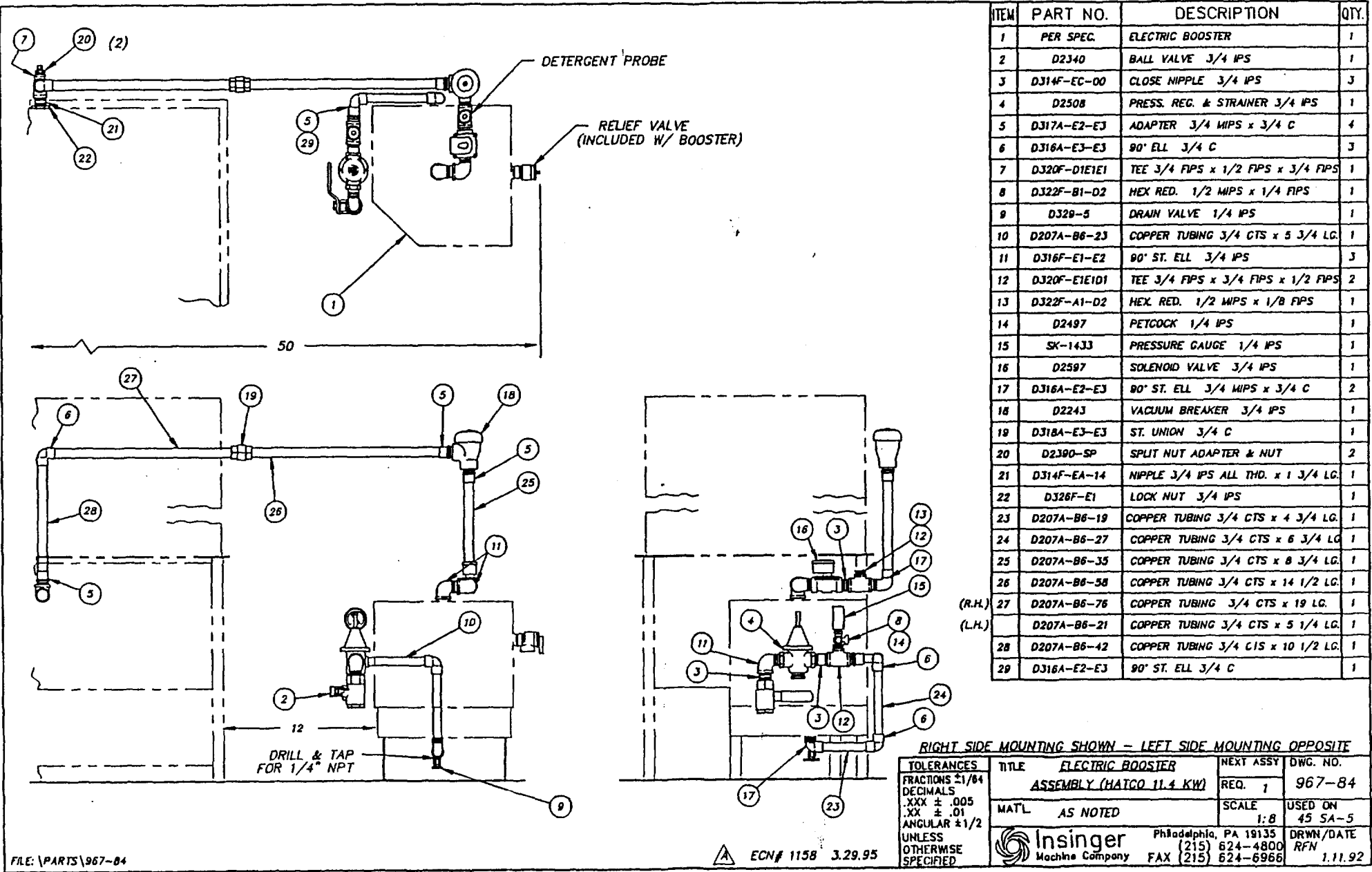
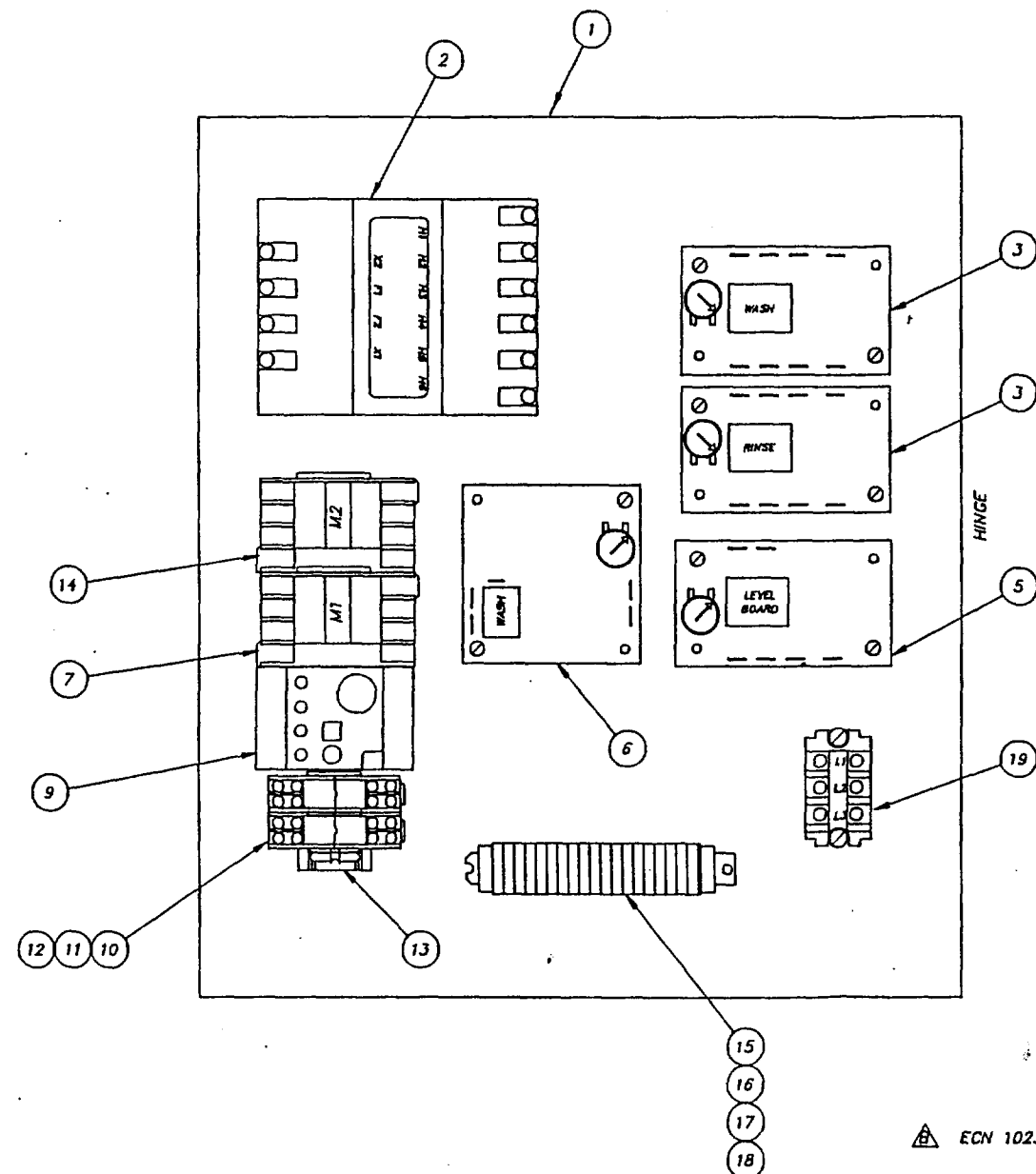


Fig. 7-10

Figure 7-10 Hatco 11.4 KW Booster





PARTS LIST-CONTROL BOX COMPONENTS

ITEM	DESCRIPTION	PART NO.	QTY.
1	ENCLOSURE & MTG PLATE	SEE TABLE BELOW	1
2	TRANSFORMER	DE6-6	1
3	TIMER, WASH, RINSE	DE7-27	2
4			
5	TIMER (LIQUID LEVEL)	DE7-31	1
* 6	TEMPERATURE CONTROL BOARD	DE9-96	1
7	CONTACTOR, PUMPS	DE1-66	1
8			
9	OVERLOAD		1
	480V-3PH-60HZ 1.8A	DE2-52	
	380V-3PH-50HZ 2.0A	DE2-52	
	240V-3PH-60HZ 3.6A	DE2-53	
	240V-1PH-60HZ 8.0A	DE2-56	
	220V-3PH-50HZ 4.3A	DE2-54	
	220V-1PH-50HZ 9.0A	DE2-57	
	208V-3PH-60HZ 3.8A	DE2-53	
	208V-1PH-60HZ 10.0A	DE2-57	
10	RELAY BASE	DE2-37	AR
11	RELAY	DE2-38	AR
12	RELAY HOLD DOWN SPRING	DE3-43	AR
13	DIN RAIL	DE9-84	1
* 14	CONTACTOR, WASH HEAT	DE1-55	1
15	TERMINAL SECTION	DE3-39	AR
16	TERMINAL END COVER PLATE	DE3-40	1
17	TERMINAL END CLAMP	DE3-41	2
18	DIN RAIL (TERMINAL STRIP)	DE3-42	1
19	TERMINAL BLOCK ASS'Y.		1
	UP TO 300VAC	DE3-9	
	300VAC TO 600VAC	DE3-3	


Fig. 7-11

AR - AS REQUIRED

• - ELECT. TANK HEAT ONLY

MODEL	ENCLOSURE	PLATE
ENS. 40-2	979-2J	-
45SA-5	DE9-37	DE9-37A

FILE: \SKETCH\SK35741

 ECN 1023 6.29.94

PG. 1 OF 2


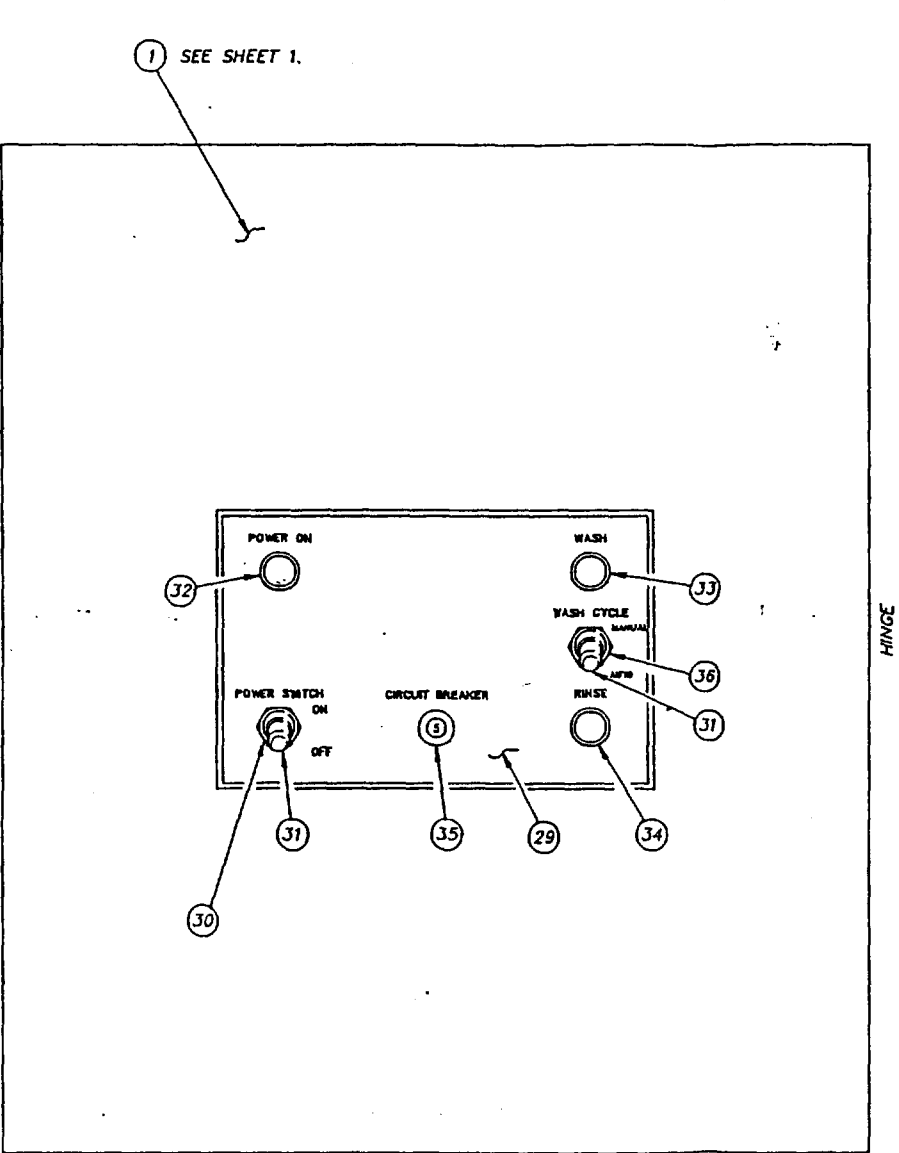
<b>CONTROL PANEL LAYOUT &amp; COMPONENTS</b> ENSIGN 40-2 & 455A-5		
 <b>INSINGER</b> MACHINE COMPANY	6245 State Rd. Tel. 215-624-4800 Philadelphia FAX: 215-624-6966 PA 19135-2998	
	SCALE: NONE	DWG. NO.
	DRAWN: MAM 2.1.84 APPROVED: CM 2.1.84	SK-3574 B

Figure 7-11 Control Panel Layout - Sht 1 of 2 SN 938043 and higher







PARTS LIST-CONTROL BOX COMPONENTS  
ENSIGN 40-2 & 45SA-5

ITEM	DESCRIPTION	PART NO.	QTY
25			
26			
27			
28			
29	LEGEND DECAL	SK-2306	1
30	SWITCH	DE5-8	1
31	BOOT, SWITCH	DE9-13	2
32	PILOT LIGHT (RED)	DE9-107	1
33	PILOT LIGHT (WHITE)	DE9-108	1
34	PILOT LIGHT (AMBER)	DE9-109	1
35	CIRCUIT BREAKER (5A)	DE9-43	1
36	SWITCH	DE5-11	1

NOT SHOWN:

TANK IMMERSION HEATER	ENSIGN 40-2 1 KW	45SA-5 1.5 KW	1
480VAC-3PH	DE13-SA73	DE13-SB73	
380VAC-3PH	DE13-SA53	DE13-SB53	
240VAC-3PH	DE13-SA43	DE13-SB43	
240VAC-1PH	DE13-SA41	DE13-SB41	
220VAC-3PH	DE13-SA33	DE13-SB33	
220VAC-1PH	DE13-SA31	DE13-SB31	
208VAC-3PH	DE13-SA23	DE13-SB23	
208VAC-1PH	DE13-SA21	DE13-SB21	

Fig. 7-12


FILE: \SKETCH\SK35742

ECN 1023 6.29.94

MAM 9.13.92

SK-3574

PG. 2 OF 2

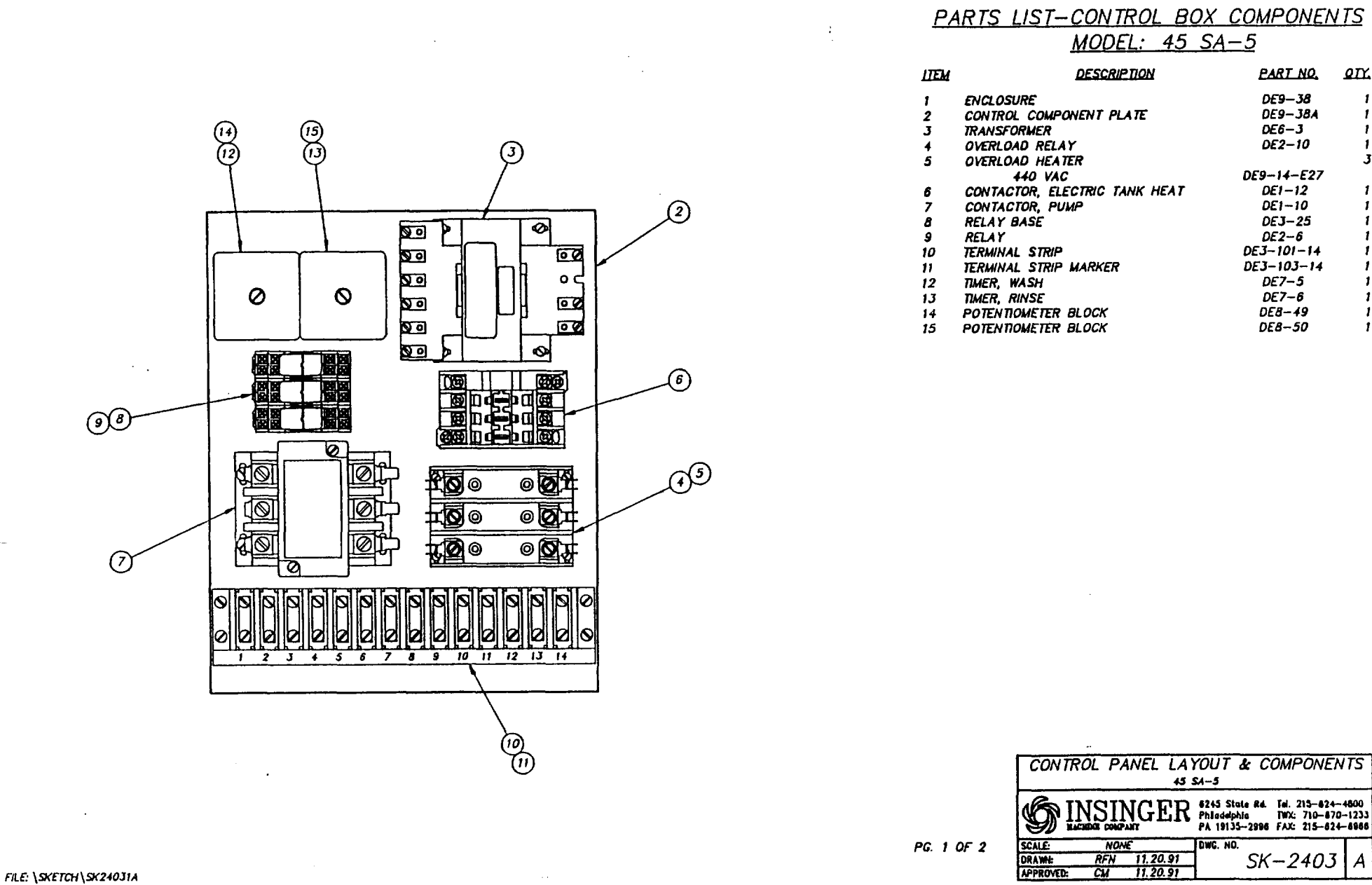


**INSINGER**  
MACHINE COMPANY

6245 State Rd. Tel. 215-624-4800  
Philadelphia FAX: 215-624-6966  
PA 19135-2996

Figure 7-12 Control Panel Layout - Sht 2 of 2 SN 938043 and higher



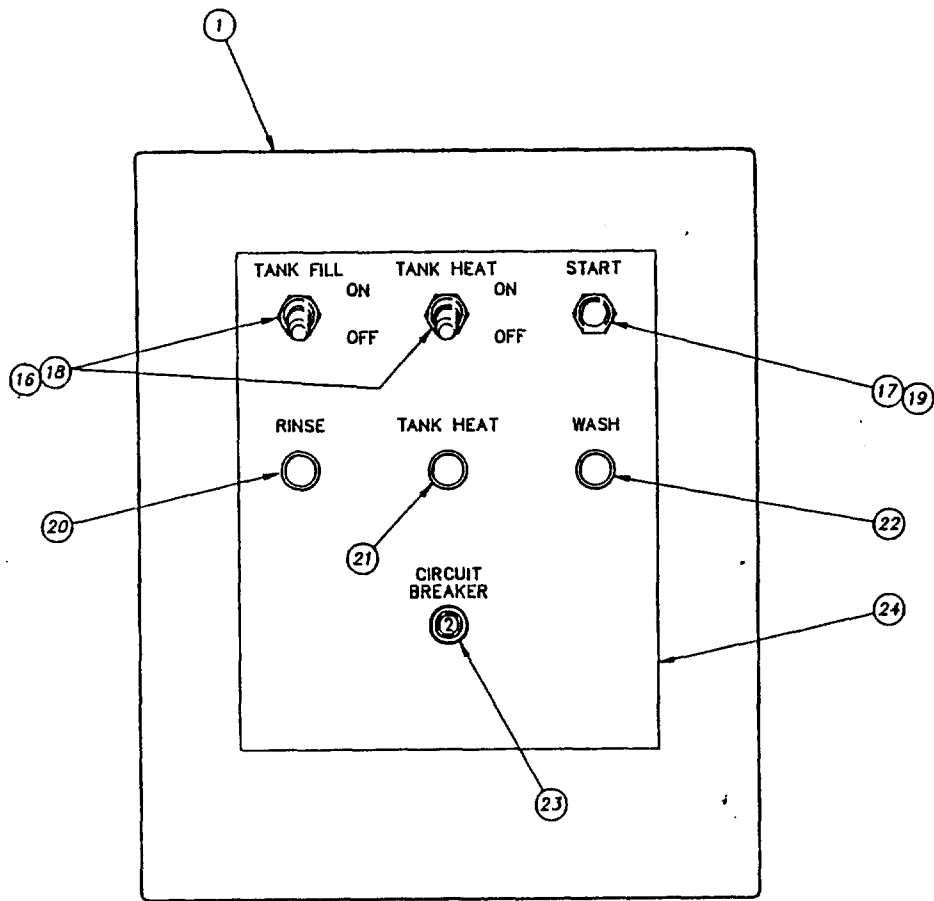


FILE: \SKETCH\SK240J1A

Figure 7-13 Control Panel Layout - Sht 1 of 2 Prior to SN 938043

Fig. 7-13






PARTS LIST-CONTROL BOX COMPONENTS  
MODEL: 45 SA-5

ITEM	DESCRIPTION	PART NO.	QTY.
16	TOGGLE SWITCH	DE5-8	2
17	PUSHBUTTON	DE5-9	1
18	TOGGLE SWITCH BOOT	DE9-13	2
19	PUSHBUTTON BOOT	DE9-24	1
20	INDICATOR LIGHT, AMBER	DE9-16	1
21	INDICATOR LIGHT, RED	DE9-17	1
22	INDICATOR LIGHT, WHITE	DE9-18	1
23	CIRCUIT BREAKER, 2 AMP	DE9-31	1
24	DECAL	SK-2751	1

Fig. 7-14

FILE: \SKETCH\SK24032A

CONTROL PANEL LAYOUT & COMPONENTS			
45 SA-5			
		8245 State Rd. Tel. 215-624-4800 Philadelphia PA 19135-2998 TWX: 710-870-1233 FAX: 215-624-8988	
SCALE:	NONE	DWG. NO.	SK-2403 A
DRAWN:	RFN 11.20.91		
APPROVED:	CM 11.20.91		

PG. 2 OF 2

Figure 7-14 Control Panel Layout - Sht 2 of 2 Prior to SN 938043



## CHAPTER 8

### SECTION 8.0 INSTALLATION

#### 8.1 UNPACKING

The 45SA5 dishwasher is shipped from the factory securely bolted to a single shipping pallet.

8.1.1 Carefully remove all external protective crating.

8.1.2 Remove all fasteners holding the dishwasher and component parts to the pallet.

8.1.3 Check that the following items have been received:

**Table 8-1 PARTS LIST**

Qty.	Description
1	Dishwasher.
1	Electrical Control Enclosure
1	Booster heater (electric or steam).
1	Detergent dispenser reservoir and controller.
1	Thermometer bracket with thermometers.
2	Plate racks.
2	Cup, bowl and cutlery racks.
2	Manifold cleanout brushes.
2	Technical manuals.

#### 8.2 INSTALLATION

8.2.1 Mechanical and Piping.

8.2.1.1 The dishwasher (with booster heater) is designed for installation under a dresser table. Position the dishwasher and booster heater underneath the table and install deck plates per standard procedures.

#### **WARNING**

**Both the dishwasher and the booster heater must be securely bolted to deck plates.**

8.2.1.2 Bolt the legs of the dishwasher and booster heater to the deck plates.

8.2.1.3 Connect a 3/4" hot water supply line (140°F. minimum) to the valve on the water inlet to the booster heater. Inlet water pressure should not be less than 20 psig. with water flowing, nor more than 125 psig static. Use unions in the piping system to facilitate the replacement of individual components.

8.2.1.4 Connect a 1-1/4" drain line to the drain coupling on the bottom of the wash tank.

8.2.1.5 For 45SA5-F1 (steam heated) machines, make the following connections:

1. 1/2" supply line to valve to wash tank steam inlet.
2. 3/4" supply line to valve to booster steam inlet.
3. 3/8" condensate return line to the wash tank trap.
4. 3/8" condensate return line to the booster trap.

8.2.1.6 Install the thermometer bracket (with wash and rinse thermometers) in an easily observed location. Neatly coil any unused capillary length.

8.2.1.7 Install the detergent reservoir and controller in an easily accessible location, above the operating level of the wash tank. Connect a fresh water feed tube from the dishwasher hot water piping to the pump on the back of the controller. Also connect a tube between the pump and the detergent reservoir, and a discharge tube from the reservoir to the machine at an elevation above the wash tank.

8.2.2 Electrical.

---

### **WARNING**

---

**Dangerous voltages are present on connections to the electrical control enclosure and electric booster heater. Observe normal safety precautions for high voltage electrical equipment when connecting to the local distribution system. All work should be done by a qualified electrician.**

### **NOTE**

Mounting hardware for the electrical control enclosure and the electrical power cables from the electrical control enclosure and electric booster heater to the ship's local distribution panel are to be furnished by the installing activity.

8.2.2.1 Install the electrical control enclosure on a bulkhead adjacent to the dishwasher. Controls should be easily accessible by the operator.

8.2.2.2 Install the 440 volt power wires between a circuit breaker in the ship's local distribution panel and the dishwasher electrical control enclosure.



**NOTE**

Power requirements for the dishwasher and booster heaters are listed in [Table 1-1](#).

8.2.2.3 For electric booster heaters only, install separate 440 volt power wires between a circuit breaker in the ship's local distribution panel and the 440 volt connections inside the booster main cover panel.

8.2.2.4 Install the power and control wires between the electrical control enclosure and the junction box on the dishwasher. Numbered terminals are provided in each enclosure for all wires.

8.2.2.5 Connect the detergent dispenser controller to the 24 volt terminals in the electrical control enclosure. Connect the probe (on the side of the wash tank) to the controller.

8.2.3 Check-Out of the Installation.

8.2.3.1 Perform the Start-up Procedure, [section 2.3](#).

---

**WARNING**

---

**At startup, and after any draining of the electric booster, turn off the 440 volt power to the booster during the initial wash tank fill (2.3.6). This will allow the booster reservoir to fill and trapped air to be purged without overheating of booster heating elements.**

8.2.3.2 Verify that pump rotation is correct. An arrow on the pump casting indicates the correct direction.

8.2.3.3 Inspect all plumbing joints for leakage and verify that water is running freely through the drain.



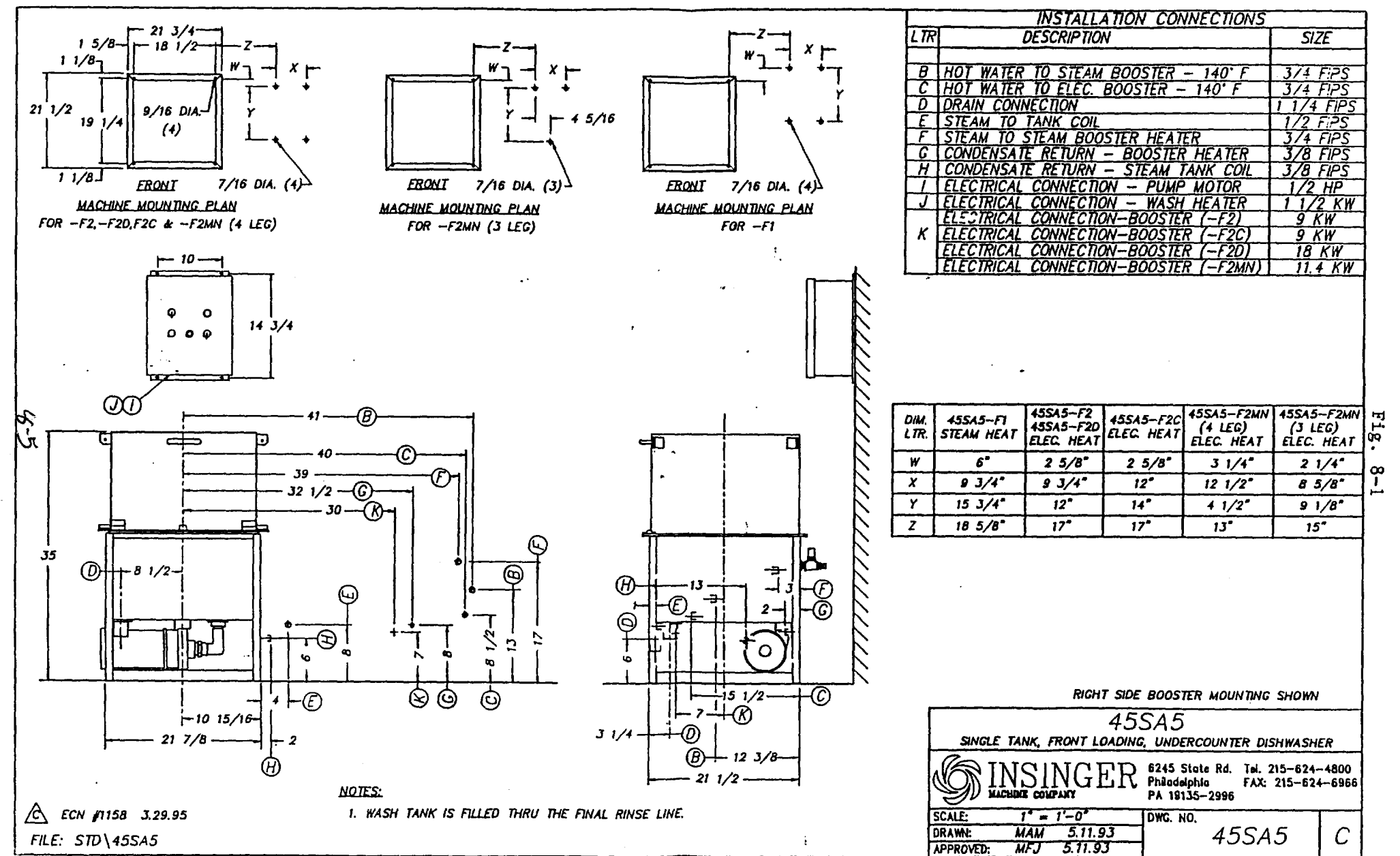


Figure 8-1 Installation - Right Side Booster



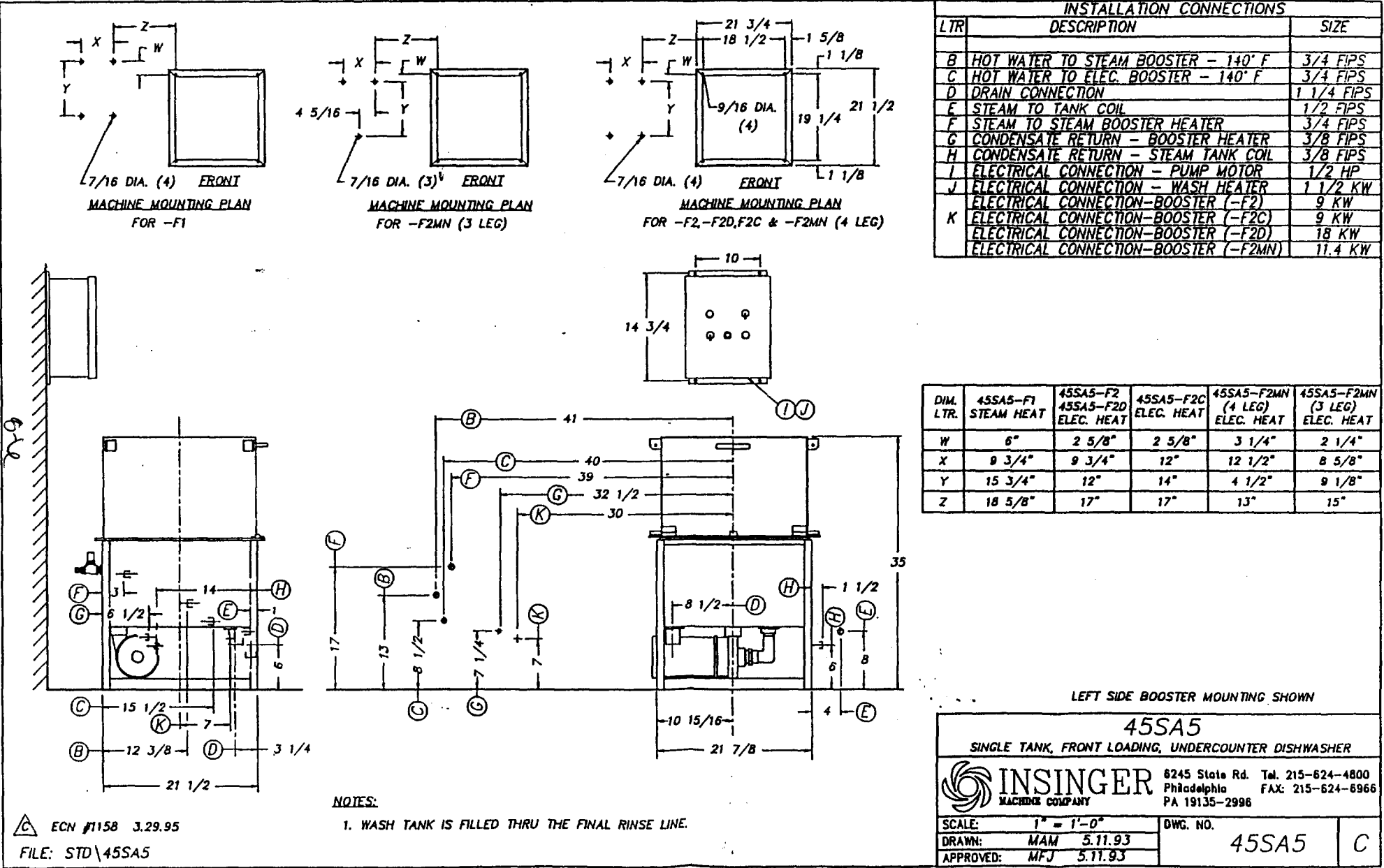
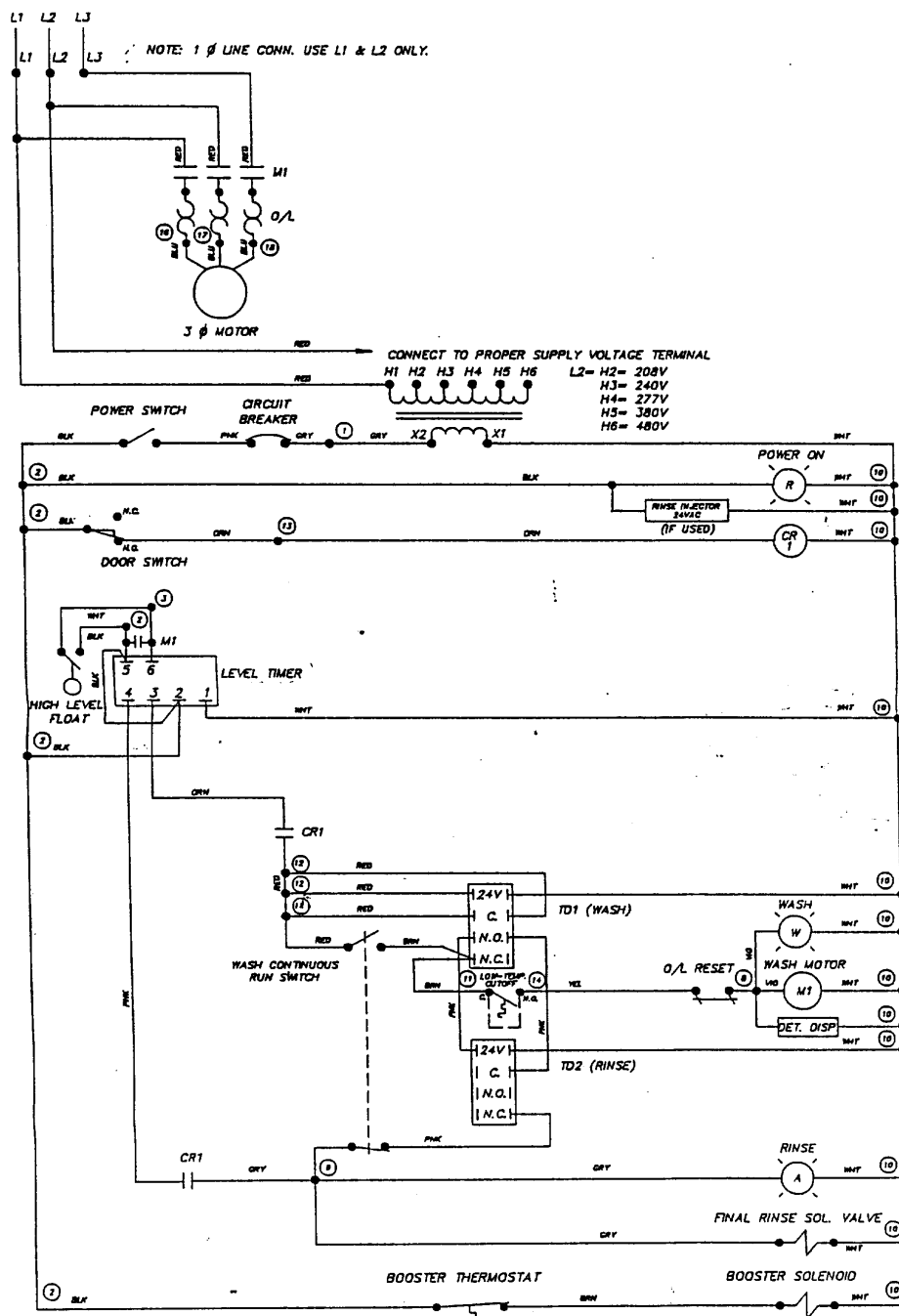


Figure 8-2 Installation - Left Side Booster



Fig. 8-3



## NOTE:

1. IF NO LOW-TEMPERATURE CUTOFF IS SPECIFIED,  
A JUMPER IS PROVIDED BETWEEN TERMINALS 11 & 14.

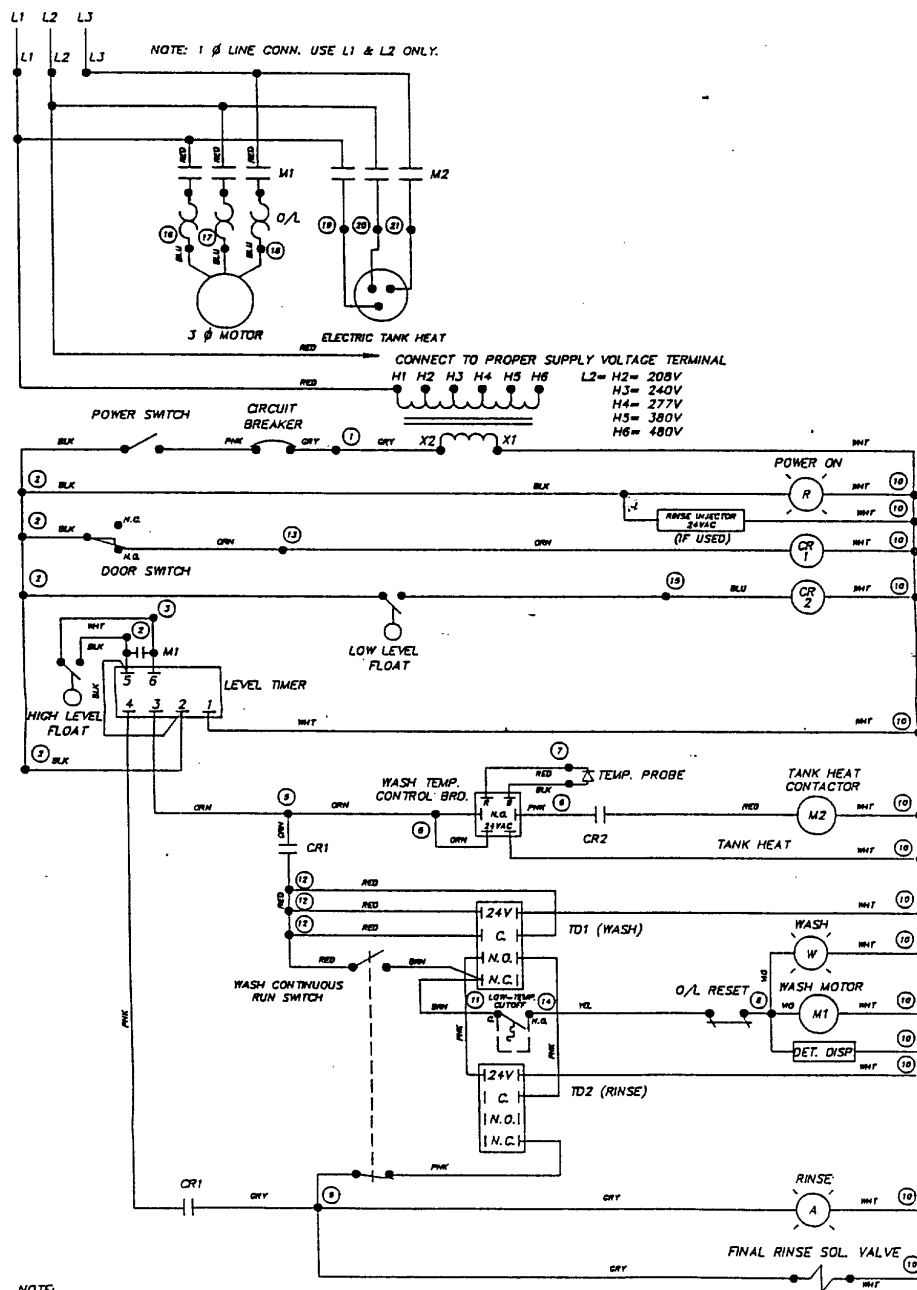
FKE:\MRE\W45SA010

ECON 976 1.11.94

<b>INSINGER</b> MACHINE COMPANY		6245 State Rd. Tel. 215-624-4800 Philadelphia PA 19135-2996 FAX: 215-624-6966	
MACHINE: 45SA 5 - STEAM DRAWN: MAM 6.14.93 APPROVED: CM 6.14.93		DWG. NO. <b>W45SA010 B</b>	

Figure 8-3 Electrical Wiring Schematic Steam Heated Machine SN 938043 and higher

Fig. 8-4



## NOTE:

1. IF NO LOW-TEMPERATURE CUTOFF IS SPECIFIED, A JUMPER IS PROVIDED BETWEEN TERMINALS 11 & 14.

<b>INSINGER</b> MACHINE COMPANY		6245 State Rd. Tel. 215-624-4800 Philadelphia PA 19135-2996 FAX: 215-624-6966	
MACHINE: 455A 5 - ELECTRIC DRAWN: RAF 08.05.88 APPROVED: MCM 08.05.88		DWG. NO. W455A020 B	

F.R.C. \WIRE\W455A020

ECN# 895 7.6.93

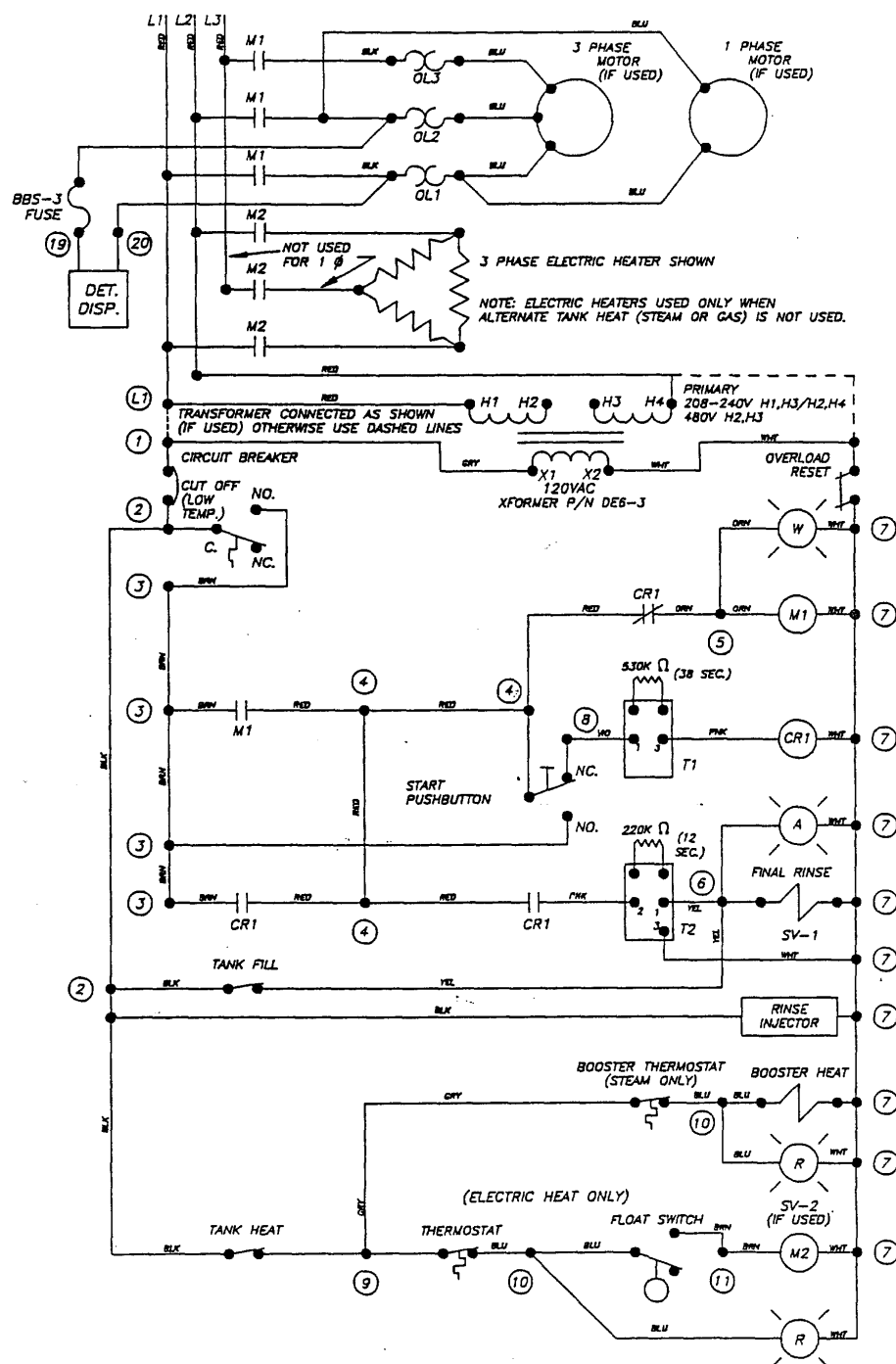
ECN# 892 6.14.93


8-8

Figure 8-4 Electrical Wiring Schematic Electrically Heated Machine SN 938043 and higher



Fig. 8-5



 <b>INSINGER</b> MACHINE COMPANY	6245 State Rd. Tel. 215-624-4800 Philadelphia FAX: 215-624-6966 PA 19135-2996	
	MACHINE: 45 SA-5	DWG. NO.
	DRAWN: WAW 2.25.93	W45SA-5
APPROVED:		

FILE: \MRE\W455A-5

Figure 8-5 Electrical Wiring Schematic Steam and Electric Heat Prior to SN 938043

